CLASSIFICATION OF SIGNIFICANT WATER RESOURCES IN THE OLIFANTS WATER MANAGEMENT AREA: (WMA 4) - WP 10383

INCEPTION REPORT

FINAL

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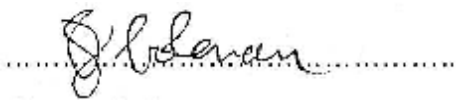

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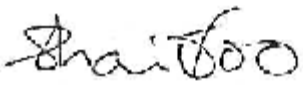

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List of Abbreviations

BID	Background Information Document
CD: RDM	Chief Directorate: Resource Directed Measures
DWA	Department of Water Affairs
DBSA	Development Bank of South Africa
EIS	Ecological importance and sensitivity
EWR	Ecological Water Requirements
IUA	Integrated Unit of analysis
KNP	Kruger National Park
MC	Management Class
NFEPA	National Freshwater Ecosystem priority areas
NWA	National Water Act
PES	Presentation Ecological State
PMC	Project Management Committee
PSC	Project Steering Committee
RDM	Resource Directed Measures
RQOs	Resource Quality Objectives
RWQOs	Resource Water Quality Objectives
SAM	Social Accounting Matrix
STATS SA	Statistics South Africa
TTG	Technical Task Group
WMA	Water Management Area
WRC	Water Research Commission
WRCS	Water Resource Classification System
WRYM	Water Resources Yield model
WRPM	Water Resources Planning Model

Classification of significant water resources in the Olifants Water Management Area (WMA 4)

Inception Report

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1.0 INTRODUCTION

1.1 OVERVIEW

The National Water Act (Act No. 36 of 1998) (NWA) is founded on the principle that National Government has overall responsibility for and authority over water resource management for the benefit of the public without seriously affecting the functioning of the water resource systems. In order to achieve this objective, Chapter 3 of the NWA provides for the protection of water resources through the implementation of resource directed measures (RDM). As part of the RDM, a Reserve has to be determined for a significant water resource, as means to ensure a desired level of protection.

The Chief Directorate: Resource Directed Measures (CD:RDM) is tasked with the responsibility of ensuring that the water resources are classified in terms of the Water Resource Classification System (WRCS) to ensure that a balance is sought between the need to protect and sustain water resources on one hand and the need to develop and use them on the other. The CD: RDM has identified the need to undertake the classification of significant water resources (rivers, wetlands, groundwater and lakes) in the Olifants Water Management Area in accordance with the WRCS.

Golder Associates (Africa) in association with Prime Africa Consultants, Zitholele Consulting and a group of supporting technical specialists have been appointed to undertake the study, 'Classification of significant water resources (rivers, wetlands, groundwater and lakes) in the Olifants Water Management Area'. The purpose of the management class (MC) is to establish clear goals relating to the quantity and quality of the relevant water resource.

As South Africa's water resources are becoming more stressed due to an accelerated rate of development and the changing weather patterns resulting in the scarcity of water resources, there is an urgency to ensure that water resources are able to sustain their level of uses and be maintained at their desired states specifically in the Olifants River catchment area. The determination of MC of the significant water resources in Olifants River System will essentially describe the desired condition of the resource, and conversely, the degree to which it can be utilised by incorporating the economic, social and ecological goals of the users and stakeholders.

1.2 PURPOSE OF THE STUDY

The purpose of this project is to coordinate the implementation of the 7 step process of the WRCS to classify all significant water resources (as so defined) in the Olifants WMA in order to determine a suitable MC for the relevant water resources and in so doing deliver the IWRM template with recommendations for presentation to the Minister.

It is understood that this project is not aimed at determining the Resource Quality Objectives or the Reserve for the water resources. Where the preliminary Reserve is available, the data for the ecological water requirements will be used to extrapolate to the nodes, when possible and appropriate.

The specific objectives of the study include the following:

- Study Inception;
- Status quo on water resources within the Olifants WMA;

- Information and data sourcing;
- Implementation of the WRCS;
- Communication and liaison; and
- Skills Development and Transfer.

1.3 PURPOSE OF THE REPORT

The inception report has been produced to better define the scope of work for the study, document any changes to the scope of work from the proposal, highlight related considerations that could influence the study, confirm study programme and indicate any revised cost estimates resulting from the initial assessments and reviews undertaken during the inception phase of the project.

1.4 STUDY AREA

1.4.1 Overview

The study area is the Olifants Water Management Area which is divided into four sub-areas, namely the Upper Olifants, Middle Olifants, Lower Olifants and Steelpoort sub-areas (Figure 1 and Table 1):

- Upper Olifants Catchment constitutes the catchment of the Olifants River down to Loskop Dam.
- Middle Olifants Catchment comprises the catchment of the Olifants River downstream from the Loskop Dam to the confluence with the Steelpoort River.
- Steelpoort Catchment corresponds to drainage region of the Steelpoort River.
- Lower Olifants Catchment represents the catchment of the Olifants River between the Steelpoort confluence and the Mozambique border.

Table 1: The sub-catchment areas within the study area

Sub-catchment	Catchment Area (km^2)	Quatenary catchments
Upper Olifants	12 250	B11 A-K, B12 A-E, B32A
Middle Olifants	22 550	B31 A-J, B32 B-J, B51 A-H, B52 A-J, B71 A-F
Steelpoort	7150	B41 A-K, B42 A-H
Lower Olifants	12 600	B60 A-J, B72 A-K, B73 A-J

The Olifants WMA corresponds with the South African portion of the Olifants River catchment but excludes the Letaba River catchment. The WMA falls within three provinces *viz*. Gauteng, Mpumalanga and the Limpopo Province and it covers approximately 54 550 km^2. Distinct differences in climate occur; from cool Highveld in the south to subtropical, east of the escarpment. Mean annual rainfall is in the range of 500 mm to 800 mm over most of the WMA.

Figure 1: Olifants WMA indicating four sub-catchment areas

The Olifants River is one of the major water resources in the area and it originates near Bethal in the Highveld of Mpumalanga. The river initially flows northwards before curving in an easterly direction through the Kruger National Park and into Mozambique where it joins the Limpopo River before discharging into the Indian Ocean.

The main tributaries are the Wilge, Elands and Ga-Selati Rivers on the left bank and the Steelpoort, Blyde, Klaserie and Timbavati Rivers on the right bank. The Olifants River is shared by South Africa, Botswana, Zimbabwe and Mozambique.

1.4.2 Socio-economic situation

Wide variations in social and economic development occur over the Olifants water management area, where the strong influence of mineral deposits on development is particularly evident. The level of development in the area is influenced by the mineral deposits. The main economic activity is concentrated in the mining and industrial centres of Witbank and Middelburg, near Phalaborwa and in the Steelpoort where a variety of minerals are found. Coal mining is the predominant mining activity, but copper, phosphate, chrome, platinum, vanadium and diamonds are also mined. The availability of a relatively cheap supply of coal has contributed to the development of both the electricity sector and the steel mills in Witbank. Some of the largest thermal power stations in the world are located in the Upper Olifants sub-area. Extensive irrigation occurs in the vicinity of Loskop Dam, along the lower reaches of the Olifants River, near the confluence of the Blyde and Olifants Rivers as well as in the Steelpoort valley and upper Selati catchment. Much of the central and north western areas of the WMA are largely undeveloped, with scattered rural settlements. Land use in the WMA is characterised by rain-fed cultivation in the southern and north-western parts, with grain and cotton as main products. While most of the water management area remains under natural vegetation for livestock and game farming as well as conservation, severe overgrazing is prevalent in many areas. Afforestation is found in some of the higher rainfall areas, with notable plantations in the upper Blyde River valley.

Ecotourism to the Kruger National Park and private game farms is also a contributor, as is the trout industry (DWAF 2003).

The predominant use of water in the Olifants WMA is by the irrigation sector, which represents about 57% of the requirements in the WMA. Other major uses are power generation with 19% and urban, industrial and mining together a further 19% (DWAF 2003).

Economic activity in the Olifants WMA is diverse and includes mining, power generation, metallurgical industries, irrigation, dry land and subsistence agriculture and ecotourism. According to a 2000 report by Urban Econ to DWAF, (cited in DWAF 2003), the Olifants WMA contributed 5% to South Africa's Gross Domestic Product (GDP) in 1997. The most important sectors and their contributions to are:

- Mining (22.1%),
- Manufacturing (18.2%),
- Electricity (15.9%),
- Government (15.6%) and
- Agriculture (7.0%).

1.4.3 Surface Water

Most surface runoff originates from the higher rainfall southern and mountainous areas. Groundwater is abstracted for irrigation in the north-west of the water management area, as well as for rural water supplies throughout most of the area. Potential for increased groundwater utilisation has been identified on the Nebo Plateau north-east of Groblersdal. Substantial amounts of water are transferred into the water management area as cooling water for power generation, while smaller transfers are made to neighbouring water management areas.

In the natural state, the quality of surface water is good. This, however, is highly impacted upon by coal mining in the Upper Olifants sub-area. Sophisticated remedial measures have been implemented to contain mine wash-off and leachate, and for controlled release of polluted water into the natural streams at times of high flows when sufficient assimilative capacity exists. Water quality problems are also experienced due to the discharge of mine effluent in the Phalaborwa area. Land degradation contributes to high sediment loads.

1.4.4 Water supply infrastructure

Several large dams have been constructed on the Olifants River and its tributaries, and the surface water resources are already highly developed. The main storage dams are:

- The Witbank and Middelburg Dams, which meet the urban and industrial demands of the Witbank and Middelburg centres.
- The Bronkhorstspruit Dam which supplies Bronkhorstspruit and the Western Highveld Region in the Elands River catchment with water for domestic and industrial use. There is also a supply for irrigation.
- The Renosterkop and Rust De Winter Dams are used to supply water for domestic use to the Western Highveld Region and for irrigation.
- Loskop Dam is used primarily to supply irrigation water to the Loskop Irrigation Board. Some water is supplied to the Western Highveld Region for domestic use.
- Flag Boshielo Dam was constructed to mainly supply water for irrigation, domestic use and support the transfer of water to Polokwane for domestic use. Many of the irrigation schemes have fallen into disrepair. Some of the irrigation schemes are in the process of being revitalised. The dam has been raised to increase the yield to supply the mines while the yield of the original dam supplies the irrigation schemes.
- Blyderivierspoort Dam, which supplies water for irrigation, local industrial and domestic demands and supports the supply from the Phalaborwa Barrage to the urban and industrial centre at Phalaborwa.

A new dam De Hoop Dam is being built on the Steelpoort River.

Large quantities of water are transferred into the water management area as cooling water for power generation. These are:

- from Nooitgedacht and Vygeboom Dams (Inkomati water management area);
- from Westoe, Jericho and Morgenstond Dams (Usutu to Mhlatuze water management area); and,
- from Grootdraai Dam (Upper Vaal water management area), partly using water from Heyshope Dam (Usutu to Mhlatuze water management area).

Rand Water supplies water from the Vaal River to several towns in the southern extremity of the water management area, while in the north water is supplied from the Letaba River (Levuvhu/Letaba water management area) for mining purposes near Gravelotte as well as to domestic users in the Olifants water management area. Water is transferred from the Olifantspoort Weir in the Middle Olifants sub-area to Polokwane (Limpopo WMA). A small transfer exists from the Wilge River to Cullinan (DWAF, 2004).

1.4.5 Water Quality

In the Upper and Middle Olifants Sub-area Integrated Water Resources Management Plan has been developed for the catchment areas. The Water Quality Objectives (WQO) set during these processes are being used to manage the catchments. The water quality in Upper Olifants sub-area is under threat from the coal mines. The management of mine water decant volumes is being addressed by the mining industry with a number of projects addressing treatment and irrigation management options. The water quality problems in the Middle and Steelpoort Sub-areas are salinity, eutrophication, toxicity and sediment. The salinity and eutrophication problems are due to the irrigation return flows, mining impacts and sewage treatment plant discharges. Pesticides and herbicides have been cited as the cause of the toxicity problems but this need to be confirmed by monitoring. The sediment is related to poor agricultural practice due to overgrazing in the rural areas. The production of sediment, particularly in the Middle Olifants Sub-area causes operational problems at the downstream Phalaborwa Barrage. In the Lower Olifants Sub-area, the water quality is influenced by the water quality of the return flows from the mining complex around Phalaborwa in the Ga-Selati River. This water quality is poor and impacts on the Olifants River. The water emanating from the Blyde River is of a good quality and together with the good quality water from the Mohlapitse River maintains the water quality in the Olifants River in the KNP at an acceptable quality (DWAF, 2004).

1.4.6 Ecological Important Areas

There are a number of ecologically important areas within the Olifants WMA and various conservation areas have been proclaimed in the WMA. The most well known conservation area is the Kruger National Park (KNP) located in the Lower Olifants sub-area of the Olifants WMA. There are other ecologically important areas in the WMA, which have not been proclaimed as conservancy areas (e.g. the Mohlapitse River).

There are also numerous pans and wetlands located in the Upper Olifants Sub-area. Many of these pans and wetlands are under threat by mining. This is due to undermining, mining through or the use of the pans for the storage and evaporation of saline mine water. There are also numerous gorges. The more important gorges are located upstream of the Mozambique border in the KNP, the transition from the highveld to the lowveld and upstream of Loskop Dam.

1.4.7 Shared Watercourse

The Olifants water management area falls within the Limpopo River Basin, which is shared by South Africa, Botswana, Zimbabwe and Mozambique. As the Olifants River flows directly from South Africa into Mozambique, where it joins the Limpopo River, developments in South Africa can directly impact upon Mozambique. Of particular importance in this respect is Massingire Dam in Mozambique, located immediately downstream of the border with South Africa, and with the total

catchment area of the dam falling within South Africa. Issues related to the management of the Limpopo River below the Olifants confluence, however, can have bearing on all the basin states of the Limpopo.

Joint utilization of the water resources of the Olifants River is facilitated through the bilateral Joint Water Commission between South Africa and Mozambique. International co-operation with respect to the use and management of the watercourses in the Limpopo River Basin, was overseen by the Limpopo Basin Permanent Technical Committee (LBPTC) with membership by South Africa, Botswana, Zimbabwe and Mozambique. The LBPTC was replaced by the Limpopo Water Course Commission, established in November 2003.

2 BACKGROUND

2.1 OVERVIEW

The NWA was promulgated to provide for fundamental reform of the law relating to water resources, recognising that water is a scarce and unevenly distributed national resource that belongs to all people. The NWA provides the Department of Water Affairs (the Department) with a mandate to protect, use, develop, conserve, manage and control South Africa's water resources in a manner that is integrated, equitable, efficient and sustainable. This mandate is based on the following key principles:

- The ultimate aim of water resource management is to achieve the sustainable use of water for the benefit of all users;
- The protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users.
- The need for the integrated management of all aspects of water resources and, where appropriate, the delegation of management functions to a regional or catchment level so as to enable everyone to participate.

The above principles are based on the National Water Policy for South Africa, 1998. The Water Resource Strategy (NWRS) describes how the water resources of South Africa will be protected, used, developed, conserved, managed and controlled in accordance with the requirements of the National Water Act and the National Water Policy for South Africa. The central objective of managing water resources is to ensure that water is used to support equitable and sustainable social and economic transformation and development.

With the promulgation of the NWA, water resources management in South Africa underwent a paradigm shift. South Africa's water resources are now managed to ensure equitable access and achieve sustainable and efficient use. The Department as custodian of the nation's water resources is mandated to protect, use, develop, conserve, manage and control the nation's water resources in a sustainable and equitable manner for the benefit of all South Africans. Sustainability encompasses both the long- and short-term protection of water resources to ensure that they can be developed and used effectively into the future.

To give effect to the interrelated objectives of sustainability and equity, an approach to managing water resources has been adopted that introduces measures to protect water resources by setting objectives for the desired condition of resources and putting measures in place to control water use to limit impacts to acceptable levels. Resource Directed Measures, together with Source Directed Controls are the key strategic approaches designed under the National Water Act (NWA) (Act No. 36 of 1998) to achieve equity, sustainability and efficiency in Integrated Water Resources Management in South Africa

The WRCS, Reserve and RQOs are protection-based measures that together form the Resource Directed Measures (RDM). These form the protection principles which are contained in Chapter 3 of South Africa's NWA. The classification system, the Reserve and RQOs together are intended to ensure comprehensive protection of all water resources. An important consideration in the determination of RDM is that they should be technically sound, scientifically credible, practical and affordable.

The WRCS which is required by the NWA, is a set of guidelines and procedures for determining

the desired characteristics of a water resource, and is represented by a MC. The MC outlines those attributes that the Department and society require of different water resources. The WRCS prescribes a consultative process to classify water resources (Classification Process) to help facilitate a balance between protection and use of the nation's water resources. The outcome of the Classification Process will be the approval of the MC by the Minister or her delegated authority for every significant water resource (river, estuary, wetland and aquifer) which will be binding on all authorities or institutions when exercising any power, or performing any duty under the NWA. Only three MC are acceptable, Class I: Minimally Used, Class II: Moderately Used, or Class III: Heavily Used. The MC essentially describes the desired condition of the resource, and conversely, the degree to which it can be utilised. In other words, the MC of a resource sets the boundaries for the volume, distribution and quality of the Reserve and RQOs, and thus the potential allocable portion of a water resource for use.

Classification thus affects both ecosystem health and the economic activities that rely on water supply and therefore has considerable socio-economic implications. It is also inherently political, as past inequities necessitate redress in terms of access to, use of, and benefit from water resources for previously disadvantaged communities.

The WRCS is designed to deliver on the outcome of the Classification Process – information for the Minister or delegated authority to set the MC of a resource. The process will require a wide range of complex trade-offs to be assessed and evaluated at a number of scales. The aim of this study is to implement the WRCS in the Olifants WMA and determining the MC of the significant resources in this WMA for presentation to the Minister.

The key phases associated with the determination of the MCs for the water resources and the delivery of the IWRM template for the Olifants WMAs will therefore include the following:

- Scope definition;
- Water Resource assessment and information gathering;
- Implementation of the WRCS to determine the management class;
- Communication and liaison; and
- Capacity building.

It is recognised that the process of classification of water resources requires a strongly driven stakeholder engagement and communication component supported and guided by the necessary technical and institutional components. Stakeholder engagement is a key consideration, however the outcome in terms of this process is essentially technically driven and supported by the appropriate institutional structures. Thus the classification of the significant water resources in the study area will not be successful if these components are not able to complement each other.

2.2 PREVIOUS AND PARALLEL STUDIES

The following previous and parallel studies have been identified for the Olifants WMA and will be consulted and used to every extent to support the information needs of this study:

2.2.1 Previous studies

- Integrated Water Resources Management Plan for the Upper and Middle Olifants (DWA, Directorate National Water Resource Planning, 2009)

- Olifants River Ecological Water Requirements Assessment Reserve Determination Study (DWA, Resource Directed Measures, 2001)
- River Health Programme Studies: Olifants River (Water Research Commission, ongoing)
- Operating rule study on the Blyde River (DWA, Directorate National Water Resource Planning, 2009)
- Olifants River Water Resources Development Project (ORWDP): Phase 1 and 2 (DWA, Directorate National Water Resource Planning, 2009)
- Integrated Water Resource Situation Assessment Studies in the Olifants WMA (DWA, Directorate National Water Resource Planning, 2003 -2004)
- Hydraulics for Ecological Reserve determination (Rapid III) for the Treur River, tributary of the Blyde River, in Mpumalanga (DWA, Resource Directed Measures, 2008)
- The Nature, distribution and value of aquatic ecosystem services of the Olifants (DWA, Resource Directed Measures 2010)

2.2.2 Parallel studies

- Olifants River System : Water Supply Reconciliation Study (DWA, Directorate National Water Resource Planning)
- PES/EIS 2010 Database Update (DWA Chief Directorate: Resource Directed Measures Water Research Commission)
- National Freshwater Ecosystems Priority Areas (NFEPA) Project. (CSIR, DWA, Department of Environment Affairs, south African National Biodiversity Institute, World Wildlife Fund, 2010)
- Situation assessment of the ecology and water quality of the Upper Olifants (CSIR and Coaltech)
- Water Supply Reconciliation strategies for towns in the Northern Region (DWA, Directorate National Water Resource Planning)
- Controlled release scheme in the Middleburg and Witbank Catchments (DWA)
- Development of a methodology for determination of Resource Quality Objectives (DWA, Chief Directorate: Resource Directed Measures).

3 INFORMATION REVIEW

Existing study results and information will be relied upon to a large extent for this study. Information review has been initiated and will be completed during the inception phase. For parallel studies ongoing liaison will be maintained with other study teams to ensure transfer of information, data and reports occurs.

3.1 RELEVANT PREVIOUS REPORTS

The following is a list of the relevant reports that have been and will be investigated as part of the water resource information review for previous studies undertaken in the Olifants WMA. At this stage this list is not considered to be exhaustive as review is still ongoing.

- Upper Olifants catchment wetland management framework. DWA, Directorate Water Abstraction and In-stream Use, Sub-directorate Environment and Recreation. Ref No 2006-088. 2007).
- Olifants WMA Water Resources Situation Assessment. DWA, Directorate National Water Resource Planning, 2004)
- The Internal Strategic Perspective for the Olifants WMA. DWA, Directorate National Water Resource Planning, 2004)
- Olifants WMA: Overview of Water Resources and Utilisation. DWA, Directorate National Water Resource Planning, 2003).
- The Olifants River Ecological Water Requirements Assessment: Technical input into the Ecological Management Class. Report No. PB 000-00-5499. DWAF, March 2001.
- The Olifants River Ecological Water Requirements Assessment: Water Quality. Report No. PB 000-00-5999. DWAF, July 2001.
- Development of an Integrated Water Resource Management Plan (IWRMP) for the Upper and Middle Olifants Catchment. P WMA 04/000/00/7007. DWA, Directorate National Water Resource Planning. July 2009. IWRMP includes the following supporting reports:
    - Hydrology Report
    - Resource Water Quality Objectives Report
    - Water Quality Situation Assessment Report
    - Water quality model calibration report
    - Economic Model
    - Yield/WRPM report
- The validation study for the Olifants WMA. DWA, 2006.
- Collection of reports/studies completed on water related aspects in support to WQP piloted in the Oilfants Water Management Area. Directorate Water Resource Planning Systems. Water Quality Planning. August 2010.
- State of the Rivers Report. Crocodile, Sabie-Sand and Olifants River Systems. WRC Report No. TT 147/01. March 2001.
- Inventory of River Health Programme Monitoring sites on the Olifants, Sabie and Crocodile Rivers. WRC. May 2001.
- The nature, distribution and value of aquatic ecosystem services of the Olifants, Inkomati and Usutu to Mhlatuze Water Management Areas. (DWA, Resource Directed Measures, 2010)
- Olifants River Catchment Technical Studies scoping meeting report (DWA, Directorate Resource Directed Measures and IUCN, 2007)

- Water Quality overview and literature review of ecology of the Olifants River. Water Research Commission. March 2010.
- Ecological and Economic evaluation of wetlands in the Upper Olifants River Catchment. Water Research Commission. November 2002.
- Smallholder irrigation and agricultural development in the Olifants River Basin of Limpopo Province: Management Transfer, Productivity, Profitability and Food Security Issues. Water Research Commission. December 2004.
- Framework and Manual for the evaluation of aquatic ecosystems services. Water Research Commission. 2010.

These reports, as well as others that are identified have been or are being assessed during the Inception phase of this study.

3.2 DATA SOURCES

Data sources to be used will include amongst others the following:

- Updated hydrology for Olifants WMA (DWA, Directorate National Water Resource Planning)
- The Water Resource Planning Model (WRPM) and the Water Resources Yield Model (WRYM) for the WMA (DWA, DWA, Directorate National Water Resource Planning)
- Water demand and requirement projections from parallel studies (Reconciliation strategy studies of DWA, Directorate National Water Resource Planning)
- Updated water quality data and information from the Water Management System of the Department. (DWA, Directorate Resource Quality Services).
- Ecological Water Requirements (Information, data, models, indices) (DWA, Directorate: Reserve Requirements).
- The nature, distribution and value of aquatic ecosystem services of the Olifants, Inkomati and Usutu to Mhlatuze Water Management Areas (DWA, Chief Directorate: Resource Directed Measures)
- Land use, population data, socio-economic data and related information from Stats SA.
- Statistics SA's Water Resource Accounts
- The Millennium Ecosystems Assessment framework of ecosystem services;
- Best practise resource economics;
- Social accounting analyses;
- The Social Accounting Matrix (SAM) models of the Development Bank of South Africa (DBSA).

The assistance of the Department may be required to facilitate the acquisition of some of the above data sources. This may include the necessary correspondence written by the client to the relevant organisations in question. Unforeseen delays in sourcing information/data could impact on the study programme.

3.3 INFORMATION GAPS

Key information gaps identified for the study relate to the ecological water requirements component and socio-economic and resource economics components:

3.3.1 Ecological Water Requirements:

- Current water quality component of the Reserve (2001) is outdated as the methodology has been changed since the previous comprehensive study. Also, only desktop assessments the water quality Reserve were undertaken by Directorate Resource Quality Services and included in the templates for each EWR site.
- Linking of EWR sites (existing, new and extrapolation) to nodes. This was partly undertaken when the management units were defined for the Upper Olifants (up to Flag Boshielo Dam). This needs to be defined for the Middle and Lower Olifants and the major tributaries (Steelpoort, Blyde and Selati) as well as the smaller tributaries.
- The EWRs were not determined for the alternative categories during the previous studies. This should be investigated to some extent and three options are available:
  - Determine the ratios between the various categories based on the desktop model and apply at each existing and extrapolation EWR site (desktop level)
  - Use the hydraulic profiles from previous study and interpret the flows during a workshop with key specialists that were involved in the previous study.
  - Make use of the approach developed by Dr A Birkhead for extrapolating environmental flows as part of the Water Research Commission Project.

  A combination of these methods will be used to determine the required EWRs needed for the study. Preference will be given to Dr Birkhead's methods.
- The ecological consequences for various scenarios were not determined during the previous study, only the yield consequences. This is very important for steps 4 and 5 of the WRCS.
- Some of the smaller tributaries are ecological different to the main stem and larger tributaries. It is important to consider this during classification and this may warrant some field work to be undertaken, e.g. rapid III Reserves to determine their specific requirements.

3.3.2 Socio-economic and Resource economics:

Two key gaps exist with regard to the socio-economic and resource economics components:

- *Data gaps*: Data gaps may be manifold, and can only be fully identified once the exact valuation problems, associated with the management scenarios for each IUA, are defined. Data gaps are common to economic valuation of this nature, and will be addressed, in the case of the classification of the water resources in the Olifants WMA, through accessing all available literature, published and unpublished databases, and expert involvement. The Olifants system is fortunately, well studied and a wide range of experts, with firsthand knowledge of the system, are available both in the project team and within the networks of the project team. In this manner, best available and reasonable evidence will be used in all valuations. The previous DWA study on 'the nature, distribution and value of aquatic ecosystem services of the Olifants, Inkomati and Usutu to Mhlatuze Water Management Areas' will be relied on to address data gaps and the outputs used in the assessments.

- *Knowledge of causal effect gaps*: These gaps relate to defining evidence-based cause-and-effect linkages between a particular management class and the economic and ecosystem goods and services that are affected by a change in management class. This gap is common in the field of resource economics. We will address it through a comparative risk assessment (CRA), wherein domain experts will take part. (CRA is both an analytical process and a methodology for prioritizing complex problems. CRA is a systematic way of clearly describing the effects of ecological change on human well-being that is transparent, clearly recorded and

repeatable. The CRA provides an objective process for prioritizing risks, and therefore the nature and extent of ecosystem effects resulting from development, captured in a risk description for each asset. A risk assessment provides a deeper understanding of meaning and context of associated risk).

4 STUDY PARAMETERS

4.1 WATER RESOURCE COMPONENTS

This study focuses on the classification of significant water resources (rivers, wetlands, groundwater and lakes) in the Olifants WMA. The selected rivers in the WMA will be classified (Refer to Appendix A for a list of study terms and definitions).

The available information will be used to prioritise their significance in the WMA and importance to associated river systems. If the available information is insufficient for the high priority wetlands then field work by the wetland specialists in the project team will be undertaken to collect sufficient information to classify the wetlands.

Groundwater is important in some rural areas within the WMA and in certain areas such as Delmas. However groundwater supply does not play a significant role in the water requirement and supply reconciliation of the WMA. Classification of groundwater resources in the Olifants WMA will not be undertaken. However for some areas such as Delmas, the contribution of groundwater to base flows will be recorded.

The aquifers in the Olifants WMA are not high yielding except in isolated areas associated with the dolomites. Groundwater does not therefore play a significant role in the water supply scenarios for the WMA. The classification of the groundwater system will not be undertaken in this project. However where over-utilisation of the groundwater resources will negatively impact on the surface water resources and where groundwater resources are threatened conditions will be recorded in the IWRM template to support sustainable use and an adequate level of protection.

- **Significant rivers**: The significant rivers to be classified within defined integrated unit of analysis (IUA) will be identified and confirmed through the inception phase. It is accepted that certain identified rivers of importance may require special mention in the IWRM template with specific conditions should they not be included in the group of “significant”. For the purpose of this study significant is defined as per the WRCS definition (Volume 2: February 2007) (refer to Appendix A). A preliminary list of significant water resources identified within the Olifants WMA include:
  - Olifants River (upper, middle and lower)
  - Witbank Dam catchment - Steenkoolspruit, Rietspruit, Koringspruit, Tweefonteinspruit
  - Middelburg Dam Catchment - Klein Olifants River
  - Klipspruit
  - Spookspruit
  - Wilge River and Bronkhorstspruit
  - Moses River and Elands River
  - Steelpoort River and Spekboom
  - Blyde River
  - Selati River
  - Treur River
  - Mohlapitse River

- **Wetlands**: All the wetlands in the study area will be assessed in terms of their abundance, health, function, importance, sensitivity and present state. A priority list of the most important wetlands will be compiled; and

- **Groundwater**: Identification of priority areas where over-utilisation of groundwater resources has been identified and where there is significant contribution of groundwater to base flows.

The updated hydrology from the studies undertaken by the Directorate National Water Resources Planning will be utilised during the classification study. Major changes to the hydrology could have specific ecological impacts/consequences. This will be highlighted and addressed during the study if so identified.

4.2 METHODOLOGY FOR EXTRAPOLATING EWRS FOR ADDITIONAL SITES

The comprehensive Olifants River Ecological Water Requirements study presented the results of 16 EWR sites for the preliminary Reserve (DWAF, 2001). These sites are situated in the Olifants River main stem as well as major tributaries. Table 2 provides the details of these sites and Table 3 indicates the sites' status and results from the previous studies. An initiative between DWA and IUCN in 2007 identified additional sites in smaller tributaries and lower confidence Reserve studies were conducted on the Bronkhorspruit (Rapid III), Treur River (Rapid III) and Dwars River (intermediate) (IUCN, 2007).

The results from both these studies will be used in this classification study. All available EWR data and supporting models will be made available by DWA to the study team for use in this study.

Table 2: Details of EWR sites from the Comprehensive Reserve study undertaken in 2001

EWR site	River: Site name	Quatenary catchments	Coordinates
1	Olifants, below Witbank Dam	B11J	S25° 45' 34.0"; E29° 18' 45.0"
2	Olifants, Loskop Nature Reserve	B32A	S25° 29' 44.4"; E29° 15' 14.8"
3	Klein Olifants, Downstream Middelburg Dam	B12E	S25° 40' 24.9"; E29° 19' 0.48"
4	Wilge, Kranskop	B20J	S25° 37' 11.8"; E28° 59' 55.7"
5	Olifants, downstream Loskop Dam	B32D	S25° 18' 14.4"; E29° 25' 19.2"
6	Elands, downstream Rhenosterkop Dam	B31G	S25° 06' 57.6"; E28° 57' 23.4"
7	Olifants, downstream Flag Boshielo Dam	B51G	S24° 31' 44.0"; E29° 32' 47.0"
8	Olifants, confluence of Mohlapitse River	B71B	S24° 14' 20.0"; E30° 04' 55.0"
9	Steelpoort, Steelpoort Park	B41J	S24° 46' 30.0"; E30° 09' 54.0"
10	Steelpoort upstream confluence with Olifants	B41K	S24° 29' 47.4"; E30° 23' 56.4"

11	Olifants, Upstream Blyde confluence	B71J	S24° 18’ 25.9”; E30° 47’ 09.9”
12	Blyde, downstream Blyderivierspoort Dam	B60J	S24° 24’ 31.0”; E30° 49’ 35.0”
13	Olifants, Tulani	B72D	S24° 07’ 36.0”; E31° 01’ 01.0”
14a	Selati, Ermelo Ranch	B72K	S23° 59’ 29.0”; E30° 41’ 00.0”
14b	Selati, Foskor Mine	B72K	S24° 01’ 21.0”; E31° 08’ 48.0”
16	Olifants, downstream Mamba weir	B73H	S24° 03’ 04.2”; E31° 43’ 56.3”

Table 3: Previous ecological study results

River	Quatenary catchment	PES	REC	EIS	Comments
Olifants	B11J	E	C	Moderate	Existing EWR site inundated due to the construction of a weir. Possible new site higher upstream
Olifants	B32A	C	B	High	Can be used for future surveys and monitoring
Klein Olifants	B12E	D	C	Moderate	Not accessible due to the development of a resort
Wilge	B20J	B	B	High	Access to be arranged prior to surveys due to the location on a fenced off area
Olifants	B32D	C	B	High	Existing site inundated due to the construction of a weir
Elands	B31G	E	D	Moderate	Not visited due to time constraints
Olifants	B51G	E	D	Moderate	Not visited due to safety reasons
Olifants	B71B	E	D	Moderate	Existing site totally changed after floods
Steelpoort	B41J	D	D	High	Site still available for surveys and monitoring
Steelpoort	B41K	D	D	High	Not visited due to time constraints
Olifants	B72D	C	B	Moderate	Existing site changed
Selati	B72K	C	C	Moderate	Not visited due to access through mine
Selati	B72K	E	D	Moderate	Mostly dry, not recommended for future use

River	Quatenary catchment	PES	REC	EIS	Comments
Olifants	B73H	C	B	Very high	Not visited
Treur	B60C	A/B	A/B	Very high	Rapid III, easy access
Dwars	B41H	B/C	B/C	High	Intermediate, easy access

The EWR extrapolation approach to be undertaken will follow the Water Research Commission (WRC) procedure (WRC, 2008).

The following methodology will be used for the determination of EWRs at the outlet of each management unit with updated hydrology from the previous comprehensive Reserve study:

- Compare the old and new natural Mean Annual Runoff (MAR). If new MAR > old MAR, no adjustment will be required. It was assumed that the higher MAR will provide adequately for the ecosystem. If new MAR < old MAR, calculate the ratio and apply this to the requirement at the EWR site. Example: If total EWR was 29.94% and the ratio between old and new MAR is 1.10, then the new requirement will be 32.9%.
- The updated PES per quaternary catchment was used for the desktop EWR determination. If the new PES = REC, then the Desktop Reserve Model (DRM) will be run and depending on (i) above the requirements adjusted.
- Where the updated PES is different to the REC, the following approach will be followed, namely run the DRM and calculate the ratio for total EWR, maintenance low, maintenance high and drought flows between the old and new category. Apply this ratio (for each flow component) with the final EWR from the previous Reserve study.

The above approach has been discussed and accepted as a feasible approach for this study. A workshop will be held with key specialist (ecologists) to confirm the new EWRs. This will also assist during steps 4 and 5 of Classification to evaluate the scenarios.

It is also important to note that the extrapolation approach used as described will not adequately cater for smaller tributaries where no information is available. It is proposed that field work be undertaken at a number of these smaller tributaries (Mohlapitse, Klaserie, Timbavati, Spekboom, Orighstad, Klein Olifants upstream Middelburg Dam) to confirm the extrapolations undertaken.

4.3 SELECTION OF ADDITIONAL SITES

Additional EWR sites should be selected, after approval from the Client, where rapid III studies can be undertaken to determine the EWRs. This is necessary as no data is available for the smaller tributaries from the previous comprehensive Reserve study. A planning session where all existing data will be used, together with the various resource units as determined during the previous Reserve study to consider all other options (extrapolation and/or estimation) before additional field work will be undertaken. The information as generated during the update of the PES/EIS (current RDM study) of the Olifants River will be used where possible and applicable. The newly developed methodology for estimation will also be utilised where possible. The assessment of additional sites if so identified will be undertaken within the task budget.

In terms of the IUAs defined and preliminary assessment undertaken as part of the inception phase of this study, two additional sites has been identified at this stage for a Rapid Reserve determination - one the Spekboom and the other on the Mohlapitse which is located in IUA 8 and IUA 10 respectively. These IUAs do not include an existing EWR from which results could be extrapolated to the Spekboom or Mohlapitse.

4.4 INTEGRATED UNIT OF ANALYSIS

Twelve preliminary IUAs have been defined for the Olifants WMA during this inception phase. These have been based on socio-economics of the areas, water uses and users, envisaged level of protection required and significance of the resource. The availability of representative EWR sites within each IUA and catchment boundaries and catchment modelling schematics were also considered. The WRCS Guideline, Volume 2, Ecological, hydrological and water quality guidelines for the 7-step classification procedure (February 2007) was also followed in terms of IUA delineation.

The scale definition of the IUAs is secondary drainage regions. The 12 IUAs proposed were reviewed and confirmed by PSC as being acceptable at its first meeting on 18th February 2011, at Loskop Dam. Sub-nodes will be added within the IUAs at ecologically important sensitive areas within the IUAs.

The study team considers the twelve preliminary IUAs as a manageable number and practical to work with in terms of the implementation of the WRCS process within the time and budget constraints of the study. However if further disaggregation is identified further in the process an additional 2 IUAs can be accommodated. This is considered cost –effective in terms of the study for classification of the water resources of the Olifants WMA.

4.5 SCENARIOS

A baseline scenario and three alternative scenarios will be defined. The scenarios will be discussed and proposed to the PSC. The additional scenarios will be analysed and the results taken back to the PSC and the broader stakeholders for discussion. All scenarios will be based on current available information. No additional assessments will be undertaken.

For those water resources that are categorised as a high ecological sensitivity and importance (identified through the current PES/EIS 2010 database update study) an assessment will be included in the scenario modelling with a view to setting a class level that will ensure these areas get protected. This may not be same for the class set for the IUA. These resources will be listed as specials conditions in the IWRM template.

4.6 STAKEHOLDER ENGAGEMENT

A robust and focused stakeholder engagement process will be undertaken that is aligned to the technical steps of the study. Every effort will be made to link and align to existing structures and forums in an effort to eliminate stakeholder fatigue which currently is a reality in the Olifants WMA. A wide and extensive stakeholder database will be setup that will periodically be updated. The idea is not to consult with everybody, but rather with representatives of specific sectors of society.

Stakeholders representing specific sectors of society (e.g. agriculture, mines, conservation) will be identified and asked to serve on a Project Steering Committee (PSC) for the duration (two years) of this project. Appendix C includes the proposed PSC member representatives for the Olifants Classification study. It is the intention that these member representatives communicate the key outcomes and decisions of the study back their constituencies and communities. It is envisaged that three PSC meetings will be held during the course of the study.

Four geographical focus groups – one each for the Upper, Middle, Lower and the Steelpoort catchment areas will be established. Meetings with these groups will be held when the need arises to discuss and evaluate scenarios specific to that area.

Stakeholders will be updated every six months on the status of the project. This will be done by the distribution of a) the announcement background information document b) a letter to all stakeholders on the database, including the media in the Olifants WMA informing them of progress made c) invitations to stakeholders to attend a geographic focus group meeting and lastly towards the end of the project it is anticipated to compile and distribute a newsletter that will provide information on the classification of important water resources in the Olifants WMA.

There will be a broader stakeholder meeting at the end of the study (during step 6) at an appropriately identified point in the WRCS process to present the scenarios. A meeting will be held in each of the four areas or if the need arises then sector-specific meetings will be held.

An Issues and Response Report will be compiled and updated continually throughout the two-year period of the implementation of the project and submitted to the Department on agreed upon intervals. This will be emailed on a periodic basis to all stakeholders to keep them informed of the issues and concerns of fellow stakeholders (Refer to Appendix B for Version 1 of the Issues and Response Report as at 31 March 2011).

4.7 RESOURCE QUALITY OBJECTIVES

Resource Quality Objectives are outside the scope of this study and will not be determined through this process. However where identified specific recommendations will be made in the IWRM summary template.

4.8 CAPACITY BUILDING

Nine DWA personnel are included and involved in the Olifants WMA classification study within the capacity building framework provided by the Directorate Water Resource Classification. Refer to section 6.5 for more detail on the capacity building programme and identified activities.

4.9 METHODOLOGY

Regulation number 810 (Government Gazette 33541), dated 17 September 2010, that gives effect to the WRCS will be followed during the execution of this project. The process will be implemented in South Africa for the first time in this study and the methodology to be followed will be iterative using the 7-step process of WRCS as close as possible. Any suggested changes to this process will be made under guidance from the client. As this is a detailed approach, efforts will be made to streamline the process where possible after discussions with the client. Efforts will be made to co-ordinate and align with the other study teams undertaking the classification process in the Vaal and Olifants-Doorn WMAs. However any proposed changes to the methodology by the client that

impacts significantly on the Olifants WMA classification process and study budget will require a scope change and approval by the Department.

4.10 FORMAT OF THE INTEGRATED WATER RESOURCE MANAGEMENT SUMMARY TEMPLATE

The standard summary template as prescribed in the WRCS 7 step procedure will be used and populated with the DWA recommendations to delegated authority. As the study progresses the template may be modified as required.

5 STUDY PROCEDURE

5.1 OVERVIEW

This study is primarily of a technical nature being supported by stakeholder participation and engagement and legal processes. The study team will ensure that in addition to achieving ecological sustainability of the significant water resources through classification due consideration of the social and economic needs of competing interests by all who rely on the water resources will be given. The team will apply the WRCS taking account of the local conditions, socio-economic imperatives and system dynamics within the context of the South African situation.

There are 6 main areas that will be addressed through the study approach. These include the:

- Status quo assessment of the WMA (water resource quality, water resource issues, existing monitoring programmes, infrastructure, institutional environment, socio-economics, sectoral water uses and users) etc.
- Definition of the IUAs.
- The application of the WRCS, i.e. establishing the MC by integration of the economic, social and ecological goals through a suitable analytical decision-making system (trade-offs).
- Stakeholder engagement, co-operative governance and consultation processes to be followed.
- Population of the classification templates.
- Capacity building

The following aspects are also fundamental to the process, and it is important that DWA and PSP share a common view in this regard.

5.1.1 Compliance with Legal Requirements

There are legal considerations that will have to inform the determination of the management classes. The process will have to be aligned to the principles and requirements of the NWA and need to be consistent with the WRCS that exists for the classification of water resources. The stakeholder involvement process that we propose to follow will comply with the WRCS guidelines and the requirements of DWA.

It is therefore important that the stakeholder engagement process, described more fully below, not only fulfils the requirements for proper Integrated Water Resource Management, but also of the new WRCS. This will ensure conformity with the principles of best practice.

The study team has included a legal expert in the group. Where the team's legal advisor cannot address any legal issues encountered, these will be referred to DWA legal section. The IWRM summary template will drawn up based on guidance and direction from the legal specialist.

5.1.2 Stakeholder involvement programme

Based on the principles of transparency, devolution of water resource management, co-operation and inclusiveness it is important that relevant stakeholders are involved in the classification process. This is essential to ensure buy-in, consensus and acceptance of the MC as well as ensure successful implementation.

Stakeholder engagement throughout the process is thus fundamental not only in support of the

requirement for consultation but for the stakeholders to believe in the ecological and economic goals and the MC, and become worthy custodians of the rivers of our country.

Stakeholder involvement or participation is a process that should lead to a joint effort by stakeholders. Stakeholders should represent all relevant interests and sectors of society, technical specialists and the various relevant organs of state who work together to produce better decisions than if they had acted independently, and better implementation of decisions through stakeholders "owning" the process. The main aim of the stakeholder engagement/participation process is to jointly find solutions and not for DWA to decide on the way forward, announce the proposed MC and to defend their decisions afterwards.

Ideally, stakeholder involvement or participation involves a process resulting in improved decision-making. This is the ultimate goal that we strive towards. The details of the stakeholder process are presented in Section 2.1.

5.1.3 Integration of stakeholder issues and technical aspects

Study teams that cannot achieve integration of stakeholder participation and technical aspects fail to meet the core purpose of their work - providing decision-makers with the information to help them understand the consequences, risks and alternatives.

True integration can only be achieved when project teams are committed to a common, well-defined purpose. In this regard the PSP team mutually understands that the roles of integrated water resource management, institutional governance and stakeholder engagement are equally important, and these should be aligned and integrated in a single approach. Considerable joint, up-front planning and ongoing interaction within the framework of a joint vision will be undertaken to ensure the desired outcomes of the classification process.

An overview of the proposed study process is illustrated in Figure 2.

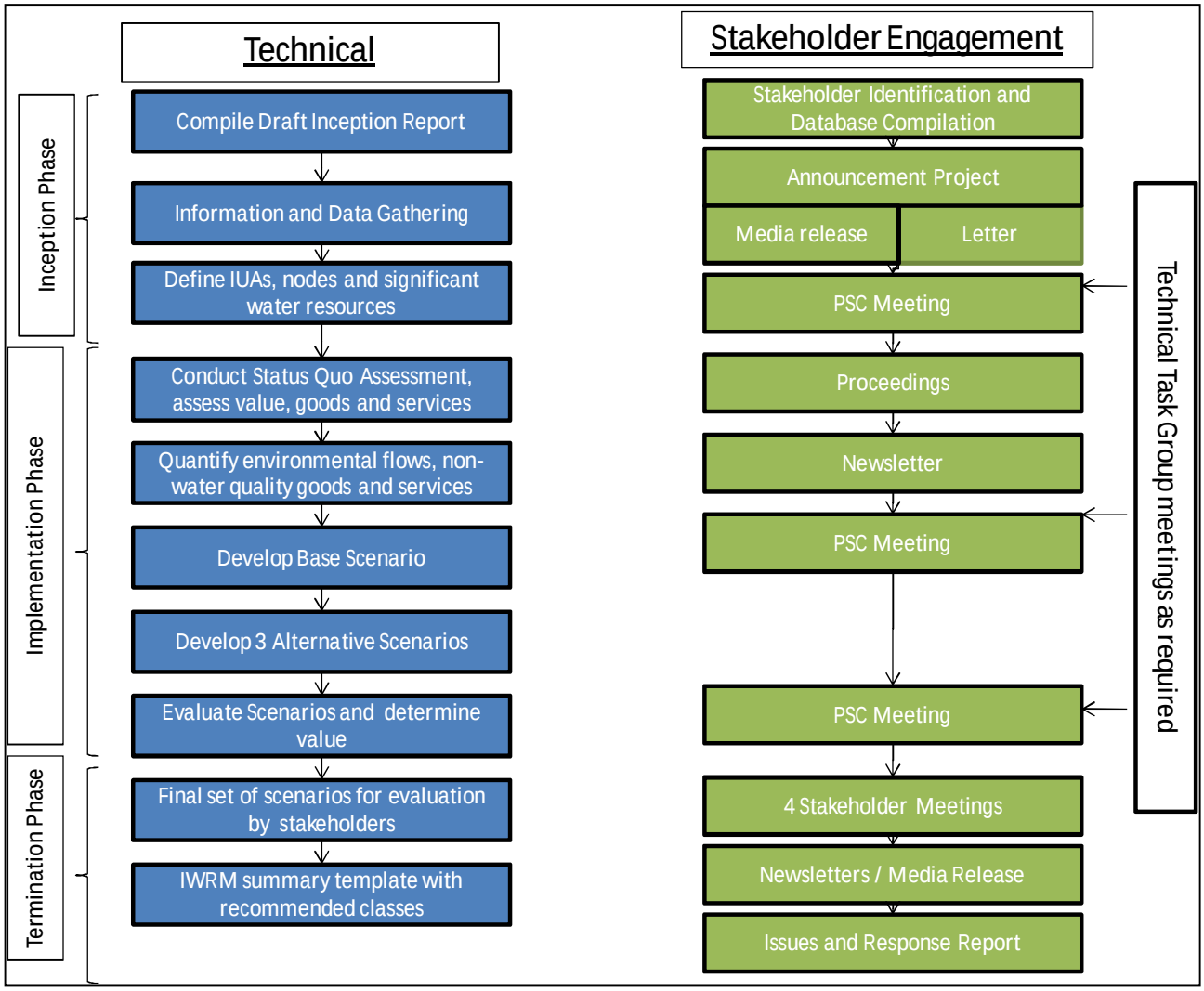

Figure 2: Overview of technical and stakeholder engagement processes of the study

6 SCOPE OF WORK

6.1 TASK 1: STUDY INCEPTION

Task 1 entails the inception phase of the study with which the team is currently busy with. The study team views the inception phase as critical since it provides a platform for assessing and understanding the nature of the scope of the project thus ensuring alignment between DWA's expectations for the study and the actual product delivered by the study team.

The purpose of this component is to clearly define the specific project scope to ensure the DWA and the team agree on the process, what is expected and the final outcomes. The purpose of the task is to clearly indicate what will not be done. These aspects have been outlined in section - 676591975 in study parameters.

All relevant information that is currently available on the study area is being sourced and documented. Gap analysis is being undertaken and results and recommendations thereof documented. Some initial gaps identified have been listed in section 3.3.

To date an inception meeting, two project management committee meetings and a technical task team meeting have been held with the study manager, officials from the Resource Directed Measures Chief Directorate (CD: RDM), the DWA Mpumalanga and Limpopo Regional Offices and other relevant DWA Directorates responsible for water resource management to discuss the approach to be followed, proposed IUAs and significant water resources, the various study tasks and activities and the envisaged process. These meetings were held between 11th November 2010 and 17 February 2011 at DWA. Proposals on the necessary study committees and proposed stakeholder engagement process were also discussed. There was a general acceptance of the technical (ecological and socio-economic approaches) and the IUAs proposed by the team by the meeting members. In addition the study team manager attended an inception meeting of the Olifants-Doorn WMA classification study on 4 November 2010 which enabled some degree of co-ordination and linkages among the three classification project study teams to be established.

An important activity that has been undertaken during the inception task is the identification of preliminary IUAs in the Olifants WMA. These have been delineated as per the criteria listed below which is in accordance with the process described in the WRCS Guideline, Volume 2:

- Catchment areas (drainage regions and water resource systems);
- Similar land use characteristics/land based activities;
- Ecological Water Requirement sites;
- Ecological Importance and sensitivity (EIS) of the water resources;
- Similar socio-economic zones (SEZs); and
- Present status of water resources (flow and quality).

Twelve IUAs have been defined. They are listed in Table 4 and described in Table 5 and illustrated in Figure 3. The EWRs from the 2001 preliminary comprehensive Reserve study and 2007 lower confidence rapid Reserves conducted on some tributaries will be used to extrapolate to the nodes identified for these IUAs.

The identified IUAs have been discussed with the Department at the above-mentioned meetings and have been proposed and confirmed at the first PSC meeting of 18th February 2011.

Table 4: IUAs delineated in the Olifants WMA

IUA	
1	Upper Olifants River catchment
2	Wilge River catchment area
3	Selons River area including Loskop Dam
4	Elands River catchment area
5	Middle Olifants up to Flag Boshielo Dam
6	Steelpoort River catchment
7	Middle Olifants below Flag Boshielo Dam to upstream of Steelpoort River
8	Spekboom catchment
9	Blyde River catchment area
10	Lower Olifants
11	Ga-Selati River area
12	Lower Olifants within Kruger National Park

The inception task also includes the definition of the role-players, project scope, interfacing with other initiatives and the study budget. This report forms the draft inception report to serve as a roadmap for the study roll out.

Task 1 Deliverables –

- Study Inception Report
- Capacity Building programme and schedule

Table 5: Descriptions of preliminary Integrated Units of Analysis defined in the Olifants WMA

IUA	Description
1	IUA 1 principally includes the local economy of eMalahleni (Witbank) and the areas of Douglas, Kriel and Kinross. The southern border of the IUA is located just north of Evander, Secunda and Bethal. The IUA includes the upper Olifants River and the Klein Olifants, Witbank Dam and the Klip River. The IUA is characterized by intensive coal mining and associated energy and manufacturing economy. The IUA is highly used and impacted. It includes a large number of coalmines, steel industry, urban areas and return flows. Secondary economic activities include dryland agriculture and a wide variety of industrial and commercial sectors. The ecological condition of the Olifants, Steenkoolspruit and Upper Klein Olifants rivers are degraded and mainly in an E category presently due to the coal mining activities, large dams and urbanisation. Their ecological importance is low except around the Witbank Dam area. This area still has some local, undeveloped areas. A number of wetlands are present in the upper reaches of the catchment. One Ecological Water Requirement (EWR) site is present on Olifants below Witbank Dam.
2	This IUA principally includes the towns of Bronkhorstspruit and Delmas as well as the Ezemvelo Game Reserve to the north. The town of Ogies is located on the border of the IUA 1 and IUA 2. The town of Cullinan is located on the border of the IUA 2 and IUA 4. The IUA includes the Wilge River and tributaries. The economy of IUA 2 is dominated by mixed coal mining and dryland agricultural activities, supported by local economies around the key towns. The Bronkhorstspruit, Saalboomspruit and Upper Wilge rivers are in a moderately modified state (category C) with less developed areas in the catchment. Impacts from agriculture, dams and some mining. The importance of these water resources is moderate, especially in terms of good water quality. An EWR site is situated on the lower Wilge, just below Emvelo game park.
3	IUA 3 includes the Loskop Dam and its surrounding protected area. The IUA starts at the confluence of the Klein Olifants and the Wilge Rivers and also includes the Selons River and the Kruis River. The IUA includes a section of the Klein Olifants between Mhluzi and the Doornkop protected area. The IUA has a largely natural and rural character. The ecological state of Lower Klein Olifants, Selons, and Loskop Dam water resources have been degraded (C to B category), mainly due to the upstream impacts from the Olifants and Klein Olifants. However, the presence of unproclaimed wilderness areas and nature reserves provides habitats for the various biota in the system that gives it a high ecological importance. Two EWR sites are present in the IUA – one in Doornkop nature reserve on the Klein Olifants and one on the Olifants just upstream of Loskop Dam.
4	IUA 4 includes the town of Cullinan, Kwamahlanga, the Rust De Winter Dam, and the rural settlements around the Mkhombo Dam. Bela Bela (Warmbaths falls outside of the IUA on the western boundary). The IUA includes the Elands, Kameel and Mkhombo Rivers and the Dinokeng protected area and Mdala Nature Reserve. The economy has a rural characteristic with a large amount of smallholdings upon which a variety of economic activities take place (agriculture, grazing, light manufacturing, associated commercial activities and some tourism). The Elands River is mainly rural in the upper reaches with impacts from agriculture, dams and settlements in the lower reaches of the catchment. The upper reaches are still in a very good ecological state (B category), but degraded along the river to a D category below the dams. Moderate important system as it provides good habitats for the biota present. Some conservation areas are present in this IUA. An EWR site on the Elands is situated below Mkhombo Dam.

IUA	Description
5	IUA 5 includes the towns of Marble Hall, Groblersdal and Roedtan. The IUA contains the Flag Boshielo Dam and the Bloed, Klipspruit and Grass Valley Rivers. Several protected areas occur within the IUA and include, Mbusa, Moutse, Kwaggavoetpad and Schuinsdraai Nature Reserves. The economy of the IUA is characterized by some intensive irrigation agriculture (specifically around Marble Hall and Groblersdal), commercial dryland agriculture (in the Springbok Flats region) and some subsistence agriculture. The Olifants River below Loskop Dam, Lower Elands and the Moses River are ecologically mainly in a C category as the upstream impacts (mainly water quality related) are somewhat mitigated by Loskop Dam. The ecological importance is moderate with a few conservation areas present. The EWR site is situated below Loskop Dam on the Olifants.
6	IUA 6 follows the Steelpoort River valley, starting from the Grootspruit River in the south up to its confluence in the north with the Olifants River main stem. It includes the towns of Belfast in the south and Steelpoort in the north. The IUA includes a section of the Verloren Vallei Nature Reserve near Dullstroom. The economy of the IUA is characterized by extensive mining, some irrigation for agriculture and tourism. The ecological condition of the Steelpoort, Klip and Dwars Rivers can be described as follows: The present state of the Steelpoort has been modified from the natural (D category) due to impacts from agriculture and settlements. The Klip and Dwars are still in a good present state. However, the impacts from mining on the Dwars resulted in a moderately modified state (B/C category). The main stem Steelpoort is of moderate ecological importance. However, the Klip and Dwars have a high importance and sensitivity (Velorenvallei nature reserve, the transition from mountain to bushveld and unique geology). Three EWR sites are present in the IUA, namely two on Steelpoort (below De Hoop Dam and just before confluence with the Olifants) and one on the Dwars just before the confluence with the Steelpoort.
7	The IUA consists primarily of dryland agriculture and rural subsistence farmers. It encompasses the Local Municipalities of Polokwane, Lepele-Nkumpi, Fetakgomo and Makhuduthamaga. The ecological importance of the main stem Olifants and smaller tributary systems is this IUA is low to moderate, especially for some of the tributaries. The present state of the main stem is in an E category that is mainly due to agricultural impacts. One EWR site below Flag Boshielo Dam is situated in this IUA.
8	The IUA is situated within the Spekboom Catchment. The IUA includes the town of Mashishing (Lydenburg) in the south and Burgersfort in the north. Several protected areas occur within the IUA and include the Sterkspruit and Gustav Klingbiel Nature Reserves. The economy of the IUA is characterized by some mining, tourism, dryland and irrigated agriculture. The present state of the Spekboom, Dorps and Waterfalls rivers range from almost natural (Waterfalls source) to degraded (Dorps). The ecological importance of the Spekboom and Waterfalls is high and moderate for the Dorps. A number of protected areas have been identified in the upper reaches of this IUA. The impacts are mainly from urbanisation and some agriculture in the catchment. No EWR site is situated in this IUA.

IUA	Description
9	IUA 9 contains the towns of Ohrigstad and Pilgrims Rest. This IUA has a high conservation status, as it is contains part of the Blyde River Catchment area. The catchment is important because it forms an integral part of the proposed Kruger to Canyons biosphere reserve. Important water resources include the Blyde River upstream from the Blyderivierspoort Dam. The economy of the IUA is characterized by irrigated and dryland agriculture, ecotourism and subsistence agriculture. The ecological importance of the Treur, Orighstad and upper Blyde water resources in this IUA is high with the present state of the Treur and upper Blyde almost natural. The Orighstad River has been impacted by agriculture and is presently in a C category. A number of protected and conservation areas are present in this IUA. One EWR site is situated on the Treur River.
10	IUA 10 contains the town of Hoedspruit. The IUA also contains the semi-urban areas of Hlohlokwe, Sofaya and Mahlomelong. The IUA contains several conservation areas, which include the Bewaarkloof Nature Reserve, the Wolkberg Wilderness area and a portion of the Blyde River Canyon catchment area. Important water resources include the Olifants River. The economy of the IUA is characterized by intensive agriculture (especially near Hoedspruit), rural subsistence, ecotourism and light commercial activities. The ecological state of the main stem Olifants, Lower Blyde and smaller tributaries in the IUA can be described as follows: The main stem Olifants is presently in a D category with the lower Blyde and Mohlapitse in a B. The impacts on the Olifants are from irrigation along the river and the Flag Boshielo Dam. The ecological importance is high for the lower Blyde (links Olifants to the Highveld) and Mohlapitse (Wolkberg area a declared wilderness area, Tufa's Waterfalls, caves). Three EWR sites are situated in this IUA, namely two on the main stem Olifants and one on the lower Blyde.
11	This IUA contains the towns of Phalaborwa, Gravelotte and Mica. The IUA is bordered by the Kruger National Park to the west and other conservation areas to the east. The IUA also contains the semi-urban areas of Ga-Mashishimale and Namakgale. Important water resources include the Ga-Selati River. The economy of the IUA is characterized by intensive mining (including the Rio Tinto copper mine near Phalaborwa), ecotourism and agriculture. The present ecological state of the Ga-Selati ranges from a C (upper reaches) to an E category just before the confluence with the Olifants. This is mainly due to the impacts from mining and town development in the lower reaches. The ecological importance of the system is high for the upper part (foothills zone) to low. The middle reaches of the IUA forms part of a protected area. Two EWR site are situated in this IUA.
12	IUA 12 includes the lower Olifants River catchment area. This IUA is largely a protected area with high conservation status. It includes the world renowned Kruger National Park. The main economic activity is eco-tourism. The IUA includes the Olifants main stem and tributaries. The water resources of this IUA falls almost entirely within the Kruger National Park and surrounding protected areas. The ecological importance is thus very high. However, the present state is in a C category that is mainly due to the impacts of the upstream developments on the Olifants River. Two EWR sites are situated in this IUA.

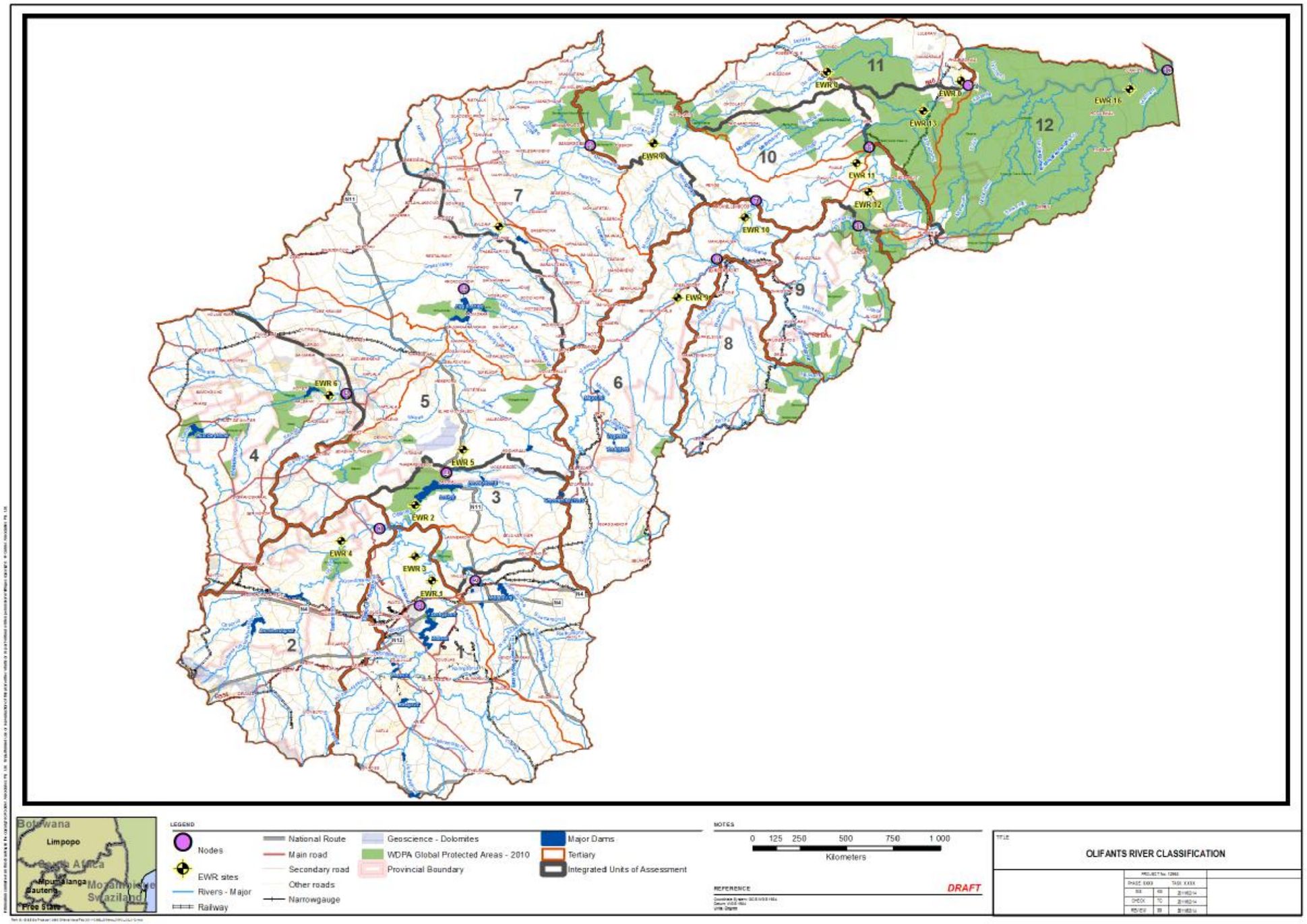

Figure 3: Preliminary IUAs (12) defined for the Oilfants WMA

6.2 TASK 2: WATER RESOURCE INFORMATION AND DATA GATHERING

The purpose of this task is to review existing literature, reports, maps and any other relevant information on the study area that is supportive to the classification process. Documents on studies such as the Overview of water resources availability in Olifants WMA (completed in 2003) and the Development of an Integrated Water Resource Management Plan which also included the study on Determination of Resource Water Quality Objectives in the for the Upper and Middle Olifants Catchments and the EWR study of 2001 will be reviewed. Information from River Health Programme studies, Mpumalanga Groundwater Master Plan, the Internal Strategic Perspectives and other related studies will be critical in performing a gap analysis to determine if there is any other additional information that is outstanding.

All previous studies undertaken for the Olifants River and its tributaries, including water resource planning, Reserve determination, water quality, socio-economic, augmentation and reconciliation strategies and specific detail studies for sub-areas will be listed and the information or data will be sourced.

This task will also include the sourcing of the models that are currently been used for water quantity and quality modelling. These include the WRPM, the ecological models used in the EWR determination study and the WQ Model – Salmon (developed by Stewart Scott for TDS modelling on the Olifants). This will be setup and test runs will be undertaken to ensure that the models are running and that all input data has been obtained. The update hydrology data will be used. It is assumed that the models to be used in thus study will be sourced and made available by the Directorate Water Resource Classification. The models currently lie with the DWA or other service providers.

All the above will be used to identify any gaps that may require some additional data collection. This will be discussed with client in finalisation of task 2. Specific recommendations will be made as to the collection of additional data and/or the extrapolation of existing data.

Task 2 Deliverables –

- Information analysis report,
- Inventory of current water resources models and their capabilities. Data storage such as utilising GIS.

6.3 TASK 3: DETERMINATION OF THE MANAGEMENT CLASS

The determination of the MC is necessary to facilitate a balance between protection and use of water resources. In determining the class, it is important to recognise that different water resources will require different levels of protection.

The classification of the significant water resources in the Olifants WMA will require a wide range of complex trade-offs to be assessed and evaluated at a number of scales. These trade-offs will include those between use and protection (which may or may not be conflicting), between downstream impacts and upstream uses and vice versa, between possible use of resources within a catchment and between catchments, and between possible resource use between different parts of the country. Decisions on these trade-offs will have different implications for different stakeholders at local, regional and national levels. In the Olifants WMA these will have to be considered at an integrated system level due to the inter-dependence of these catchments. There

are also international considerations due to the International agreement between the South Africa and Mozambique. In addition due to the economic demands and high level of development within this WMA the valuation of the water resources, its condition, use and ecosystem characteristics are crucial to the evaluation of scenarios.

The classification process has bearing on a range of broader processes, given the wider socio-economic, political and ecological implications of the class. Accordingly, cooperation with all three spheres of Government, participation of stakeholders and engagement with civil society is required to ensure appropriateness and acceptability of the proposed class. The classification process will need to be aimed at ensuring consensus seeking, participation and cooperative governance to ensure that the socio-economic balance and sustainability in addition to the technical elements of ecological sustainability are achieved.

The 7 step process of WRCS will be implemented in order to classify all significant water resources in the Olifants WMA and determine a suitable Management Class for the relevant water resources (Figure 4).

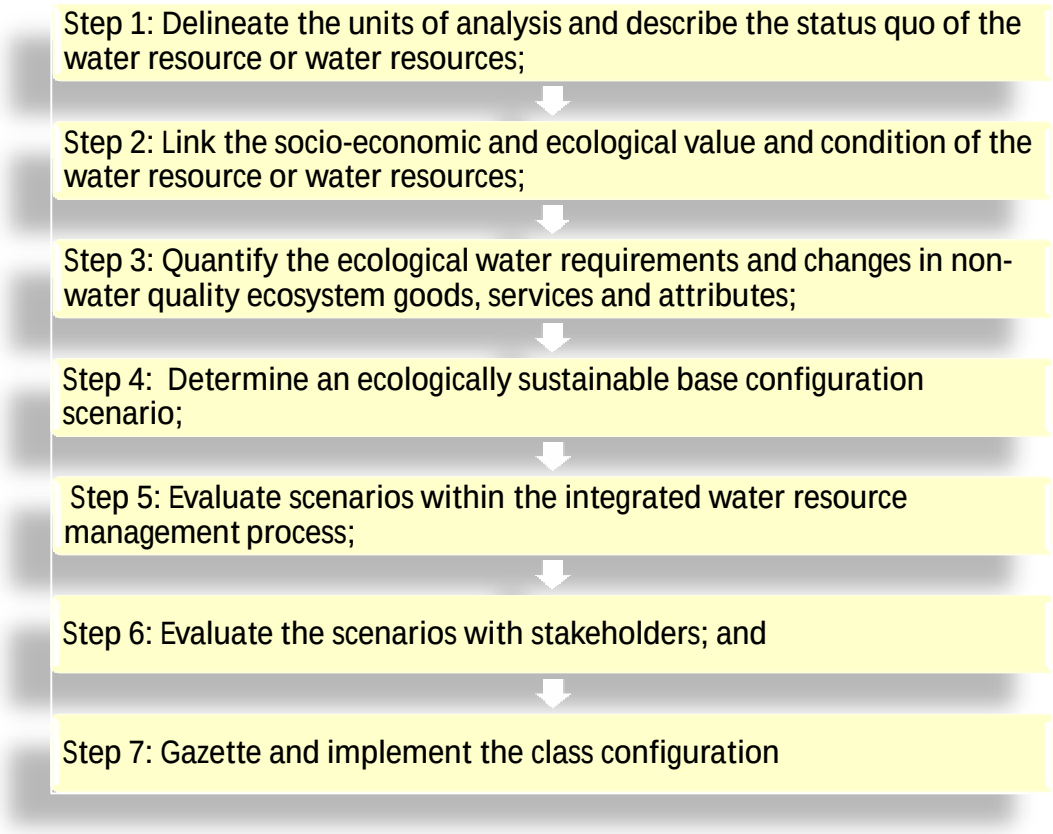

Figure 4: Steps to determine the Management Class

As this study is one of the first involving full scale implementation of the WRCS in a WMA that includes a number of competing water uses and vast contrasts in development and protection areas the application of the approach and process and will require intensive collaboration between the client and the study team. The Olifants WMA is one of 3 WMAs were classification in terms of a promulgated WRCS will be undertaken. Accordingly, this will be an interactive process and may have to be adapted according to the project lessons and circumstances. The team will also strive

to ensure that as much of the existing information will be used and the steps kept as simple as possible. As the process unfolds, the dynamics of the study area, local conditions and stakeholder drivers may also influence the outcome.

The most challenging aspect will be trade-offs that will have to be made since the Olifants WMA includes intensive development and activity in the upper catchment and protected and conservation areas in the lower catchment areas. In addition it is an international river shared between two countries. A sound, integrated and analytical decision making system will be required. The decision-analysis framework provided by the WRCS guideline will be adapted to suit the circumstances. Multi-Criteria Decision Making analysis (Cumulative Risk Analysis approach) supported by the necessary Cost Benefit Analysis will be applied to ensure a robust, defendable process that allows weighing up the advantages and disadvantages of all alternatives, resulting in a desired outcome.

The WRPM will be used to evaluate the scenarios within the IWRM process. This information will be used and, where necessary and depending on the socio-economic zones under investigation, adjusted.

6.3.1 Proposed Approach

The proposed approach for the determination of the management class is outlined in Figure 5.

In terms of Figure 5 the approach to be followed in the implementation of the 7 step WRCS process will include the following:

- At the finalisation of the inception phase the IUAs, nodes and significant network of water resources will be defined.
- It is proposed that a limited visioning exercise will be undertaken at the first PSC meeting to determine what the key stakeholders require in terms of the level of protection of water resources in the Olifants WMA (extent use of the water resources). This will be undertaken through a brief questionnaire that will be distributed to members. The feedback obtained will be collated and this input will to some extent provide some useful insight into scenario development.
- The status quo assessment of the WMA, valuation of water resources, present ecological assessment, ecological water requirements determination and related flows at each node will then be defined. This step will provide an understanding of the status quo and PES and EIS and provide an initial set of classes (and/or sub classes).
- A base scenario with a set of the environmental flows and water qualities at each node will be set up. These will then set it up in the planning model. The model will then be run and outputs fed into the economic modelling assessments. A value will then be determined that will form the base scenario configuration.
- The base scenario will then be proposed to the PSC. Based on feedback a further three scenarios will be set up. These will be evaluated and modelled and then fed back to the PSC for final sanctioning.
- The accepted three scenarios will then be taken forward through the modelling processes and the value determined. An assessment will be made to confirm if these can be practically met. Dis-benefits to users will be assessed. The results of these scenarios will be compared to determine if they are sustainable, economically viable and meet the basic well being of the users in the catchment.

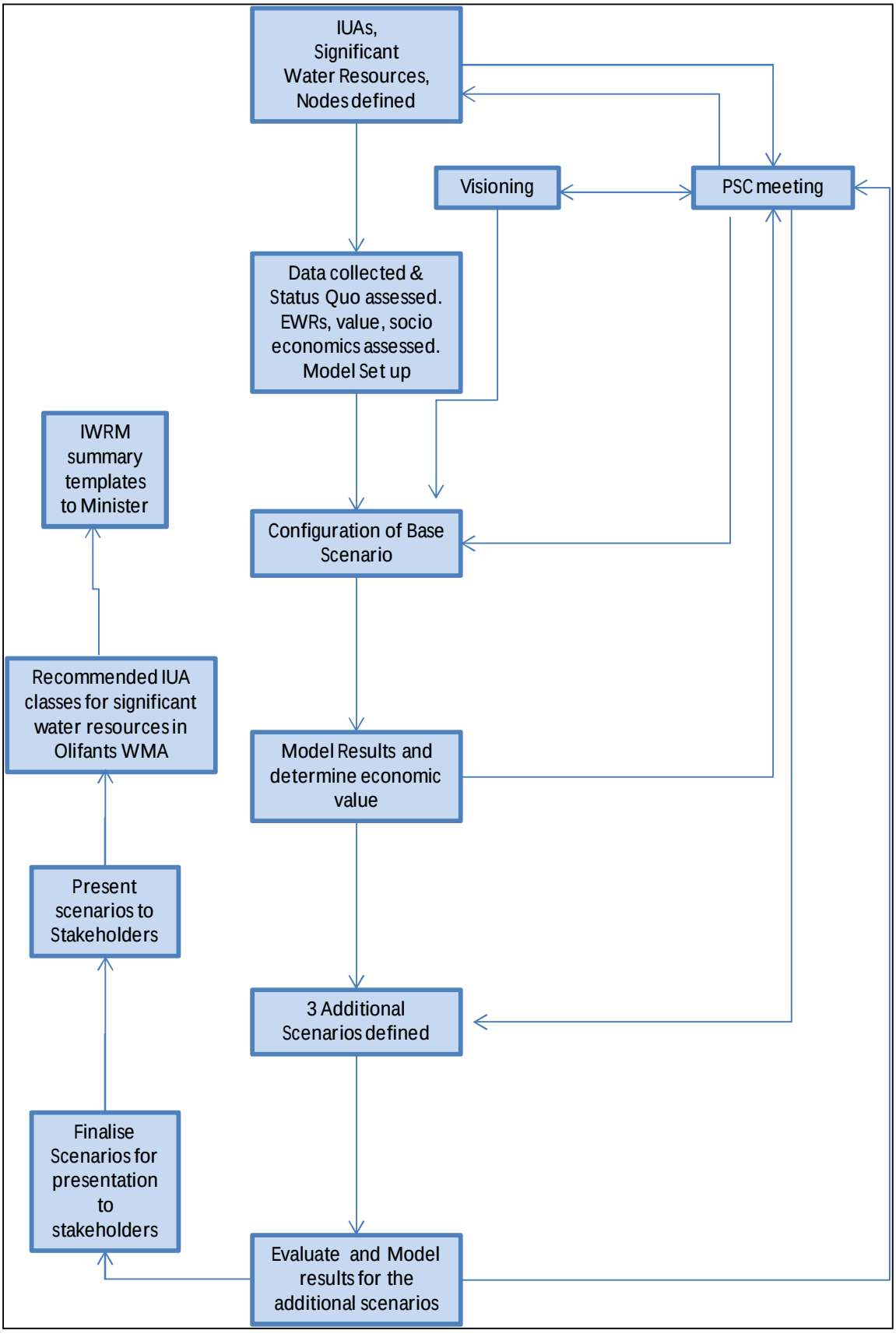

Figure 5: Proposed approach for determination of the management class

- The final set of scenarios will then be evaluated by consultation with stakeholders through step 6 of the process (broader stakeholder groups – one meeting in each of the four catchment areas). During this step trade-offs will have to be made. If required a further meeting will be held with the stakeholders. This meeting will be a single meeting rather than a meeting in each of the four catchment areas.
- The outcome of this process will result in the final MC to be recommended for each IUA. In the Olifants WMA. These will have to be practical and achievable.
- The IWRM summary template with recommended classes and supporting information will be populated.
- The recommended MC will be submitted to the Minister for approval.

The above will be conducted in terms of the prescribed steps of the WRCS guidelines as outlined below (DWA, 2007) as best suited to circumstances and conditions that prevail:

6.3.2 Task 3a: Delineation of the units of analysis

- Description of the present-day socio-economic status of the catchment;
- Division of the catchment into socio-economic zones;
- Identification of a network of significant resources, description of the water resource infrastructure and identification of the water user allocations;
- Definition of a network of significant resources and establishment of the biophysical and allocation nodes.
- Description of the communities and their wellbeing;
- Description and valuation of the use of water;
- Description and valuation of the use of aquatic ecosystems;
- Definition of the Integrated Units of Analysis (IUA);
- Development and/or adjustment of the socio-economic framework and the decision-analysis framework; and
- Description of the present-day community wellbeing within each Integrated Unit of Analysis.

6.3.3 Task 3b: Link the value and conditions of the water resources

- Selection of the ecosystem values to be considered based on ecological and economic data;
- Description of the relationships that determine how economic value and social wellbeing are influenced by the ecosystem characteristics and the sectoral use of water; and
- Definition of the system for evaluating scenarios.

6.3.4 Task 3c: Quantifying the ecological water requirements and changes in non water quality Ecosystem goods, services and attributes

- Identification of the nodes to which Resource Directed Measures data can be extrapolated and making the extrapolation;
- Development of the rule curves, summary tables and modified time series for all nodes for all ecological categories; and
- Quantification of the changes in relevant ecosystem components, functions and attributes for each ecological category for each node.

6.3.5 Task 3d: Determine an Ecologically Sustainable Base Configuration scenario and establish starter configuration scenarios

- Determination of an Ecologically Sustainable Base Configuration (ESBC) scenario that meets feasibility criteria for water quantity, water quality and ecological needs;
- Incorporation of the planning scenarios (future use, equity considerations and existing lawful use); and
- Establishment of the Resource Directed Measures configuration scenarios.

6.3.6 Task 3e: Evaluate the scenarios within the Integrated Water Resource Management Process

- Running of a yield model for the Ecologically Sustainable Base Configuration scenario and other scenarios and adjust the scenarios if necessary;
- Assessment of the water quality implications (fitness for use) for all users;
- Reporting on the IUA-scale ecological condition and aggregate impacts for each preliminary scenario;
- Valuation of the changes in aquatic ecosystems and water yield;
- Description of the macro-economic and social implications of different catchment configuration scenarios;
- Evaluation of the overall implications at an Integrated Unit of Analysis-level and a regional-level; and
- Selection of a subset of scenarios for stakeholder evaluation.

The above evaluation will be undertaken in the broader context of IWRM in the WMAs where the ecological, economic and social trade-offs will be made.

6.3.7 Task 3f: Evaluate scenarios with stakeholders

- Stakeholders evaluation of scenarios and agree/or disagree on a short-list; and
- Recommendation of classes for the Integrated Units of Analysis.

6.3.8 Task 3g: Gazette the class configuration

- Population of the Integrated Water Resource Management summary template and presentation to the Minister or his/her delegated authority for consideration and approval if accepted.

Task 3 Deliverables –

- Integrated Units of analysis report
- Socio-economic reports (Evaluation and decision-analysis framework and Method Summary report, analysis system)
- Ecological water requirements report
- Base scenario configuration report
- Final scenarios report (including consequences)
- IWRM summary template

6.4 TASK 4: COMMUNICATION AND LIAISON

Public participation in environmental processes is not only a statutory requirement, but a process that should lead to a joint effort by stakeholders. Stakeholders should represent all relevant interests and sectors of society, technical specialists and the various relevant organs of state who work together to produce better decisions than if they had acted independently, and better implementation of decisions through stakeholders "owning" the process.

It is very important to note that the process is not measured solely by the letter of the law's minimum requirements. The principles used world-wide to characterise and measure a thorough and legitimate stakeholder participation process, and which will be applied in this process, is noted in the box below.

Universal stakeholder participation principles

- Consultation is inclusive. It takes place with all sectors of society and affords a broad range of stakeholders the opportunity to become involved.
- Information is sufficient to allow meaningful contributions, and is accessible.
- Information is presented in various ways, e.g. by way of background information documents, newsletters, media releases, letters and advertisements.
- There are various opportunities for comment, at various stages in the process.
- Stakeholders are supplied with information that assists them to understand their roles and responsibilities in the process.

These are in line with the core values of the International Association for Public Participation (IAP2). The study members responsible for stakeholder engagement are members of the IAP2 affiliate in South Africa. Our team members have each successfully undertaken the certificate courses by the International Association to be official practitioners in public participation.

The stakeholder process for the classification process is summarised in Figure 6.

6.4.1 Stakeholder identification and database

The identification of stakeholders will be an on-going process, refined throughout the process as the on-the-ground understanding of affected stakeholders improves through interaction with various stakeholders in the Olifants WMA. The identification of key stakeholders and community representatives for this project is important and will be done in collaboration with the Department, and stakeholders in the study area.

Stakeholders' details will be captured on an electronic database management software programme (Maximiser 9.0) that automatically categorises every mailing to stakeholders, thus providing an on-going record of communications. In addition, comments and contributions received from stakeholders are recorded linking each comment to the name of the person who made it.

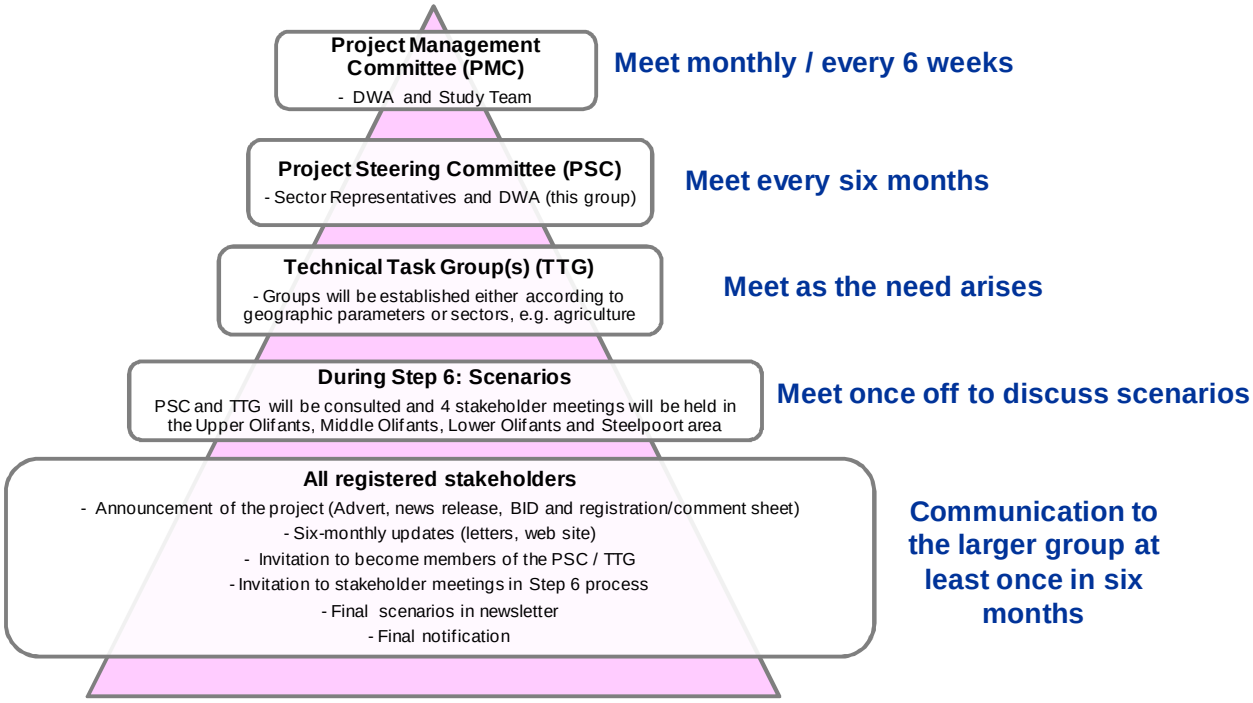

Figure 6: Summary of stakeholder engagement process to be undertaken in the Olifants classification study

Typically, our team would identify stakeholders representing the following sectors of society:

- national, provincial (Mpumalanga and Limpopo) and local government (relevant local and district municipalities);
- relevant residents' associations, rates payers organisations, community based organisations, agricultural organisations and NGOs;
- environmental and water bodies, forums, groups and associations;
- private sector (mining, business, industries) in the vicinity;
- civil society; and
- regional and local media.

The draft database will be compiled during the first few weeks of the project implementation period; however a database is dynamic and will be constantly updated as more information becomes available and as stakeholder information change.

6.4.2 Announce the project

After the Inception Report is approved a background information document (BID) will be compiled for distribution to all stakeholders that are listed in the database. The purpose of this document will be to announce that the DWA is undertaking the classification process of significant water resources in the Olifants WMA, the process to be followed, anticipated activities, proposed time lines as well as how stakeholders can become involved in the project. The same information will also be sent to the media and should be combined with a media release and advertising campaign as well.

The BID will be accompanied by an announcement letter and a comment/reply sheet to provide people the opportunity to comment on the classification study and to register as a stakeholder or provide names of other possible stakeholders.

This document will also aim to explain the necessity of the project and the context of the study. Information such as where more information can be obtained, the web address for downloading of information, etc will also be shared. At this early stage in the project stakeholders will be requested to provide their comments and inputs. Responses will be captured in an Issues and Responses Report.

6.4.3 Issues and Responses Report

An Issues and Responses Report will be compiled and updated throughout the two-year period of the implementation of the project. This report will list all the comments from stakeholders (to be received from comment sheets, at meetings, via telephone calls, etc) and responses from the project team. (Refer to Appendix B for Version 1 of the Issues and Response Report as at 31 March 2011).

6.4.4 Evaluation of scenarios with stakeholders – Step 6 of WRCS process

Stakeholders have to evaluate the scenarios presented by the DWA and its study team. The following approach and steps are anticipated:

- Identification of stakeholders to be invited to a workshop where the scenarios are to be presented. These stakeholders will all be representatives of specific sectors in a specific geographical area;
- Four workshops will be held: one each in the Upper Olifants, Middle Olifants, Lower Olifants and Steelpoort catchments. If required, further meetings will be held with specific sectors.
- Distribution of invitation letters and proposed agenda to the identified stakeholders providing them sufficient information about the status of the project, the purpose of the workshop/s and what will be expected of them (e.g. read through documents prior to the meeting/s and provide inputs and comments).
- Compilation of a simplified document explaining the various scenarios and distributed that to all stakeholders prior to the workshop/s.
- Hosting of workshop/s with proper presentations of the different scenarios where thorough minutes can be taken which will act as a record of stakeholder comments and inputs.
- Distribution of minutes of the workshop/s.

Should the scenarios which were presented have changed significantly with the consideration of stakeholder comments, the process to invite stakeholder inputs on the revised scenarios will have to be repeated to reach an acceptable level of agreement with stakeholders.

Once the scenarios have been agreed upon, stakeholders have to be informed of the “short-listed” scenarios which will be submitted for final sign-off.

6.4.5 Establishing a Project Steering Committee

Stakeholders representing specific sectors of society (e.g. agriculture, mines, conservation) will be identified and asked to serve on a Project Steering Committee (PSC) for the duration (two years) of this project. The PSC should be a relatively small group of people of key representative bodies that

will ensure strategy implementation and provide strategic advice and guidance. A proposed list of members is included in Appendix C.

The PSC will be invited to a meeting only when the study team has new information to discuss with the stakeholders. Invitation letters and a proposed agenda will be distributed to the PSC members providing them with sufficient information about the status of the project, the purpose of the meeting and what will be expected of them (e.g. read through documents prior to the meeting and provide inputs and comments). It is anticipated that the PSC will not meet more than three times over the two-year period.

A Terms of Reference has been drawn up by the study team to assist members of the PSC understand their roles and PSC objectives.

6.4.6 Technical task group meetings

A technical task group for the study will be set up. Stakeholders will be identified (per relevant sector of society, impact on water use, technical input/clarification required, information needs, etc.) and invited to attend these meetings. It is anticipated that these meeting will be held on an ad-hoc basis when the need arises. Prior to these meetings the necessary documentation will be compiled and distributed explaining for example the various scenarios to be investigated.

The nature and composition of these meetings will vary. This will be determined by the study team together with the client.

These meetings will be announced at least a month before the time and all members of the PSC will be informed, should they be interested in joining a specific technical meeting.

6.4.7 Meetings

The study team will assist with all the arrangements of these meetings. Our proposed methodology for arranging any type of meeting is as follows:

- There must be a clear purpose for a meeting and the objectives of what needs to be achieved by the meeting is clearly defined.
- Stakeholders must receive notification of the meeting date and its objectives at least three weeks in advance.
- A formal advance registration process was allowed.
- Stakeholders must receive documentation such as a draft agenda for the meeting at least five working days before the meeting.
- A dry run meeting for project team members must be conducted in advance to agree on the content of the meeting, the comprehension levels of presentations and to strategise for discussion sessions.

6.4.8 Continuous feedback to stakeholders

Stakeholders need guided and informed from the beginning to the end of a project. It is recommended that stakeholders be updated every six months on the status of the project. This will be done by the distribution of a) the announcement background information document b) a letter to all stakeholders on the database, including the media informing them of progress made c) invitations to stakeholders to attend a geographic focus group meeting and lastly towards the end

of the project it is anticipated to compile and distribute a newsletter that will provide information on the classification of important water resources in the Olifants WMA.

The DWA website needs to be utilized for the publishing of all public information (announcement documentation, minutes of meeting, etc) to enable stakeholders with access to electronic media to stay updated in this fashion.

6.4.9 Collaborating with existing projects / structures in the Olifants WMA

Existing projects of the DWA in the Olifants WMA and organisations such as the Olifants River Forum and the Olifants Joint Water Forum will also be used to market and promote this project.

Task 4 Deliverables –

- Stakeholder database
- Two Newsletters, Background Information Document, Media releases and Advertisements
- Notes and minutes/proceedings of the PSC and stakeholder meetings held
- Registers of stakeholders of all meetings
- Issues and response report

6.5 TASK 5: CAPACITY BUILDING

In terms of building capacity and ensuring skills transfer in DWA staff, the seven individuals who have been identified through the DWA project manager and the Directorate's capacity building framework will be used in the execution of specific tasks on the project and in the general running of the study. This will ensure the broadening of the RDM skills base. There is also the opportunity for members from the Department to be seconded to the study team to assist in the study. These opportunities will be explored as the study unfolds.

The nine DWA individuals include:

- Tovhowani Nyamande
- Rufus Nengovhela
- Mbali Dlamini
- Andiswa Makam
- Mthobisi Soko
- Kgolane Reineth
- Motau Sepadi
- Mabasa Happy
- Shibambu C S

In terms of capacity building the study team proposes the following:

- Accommodate DWA personnel in various day to day project activities – such as information assessment, status quo assessment activities; etc.
- Arrange and conduct workshops on water resources modelling with the DWA personnel. This will be co-ordinated with the other study teams. Personnel will be trained in the WRPM model and in scenario analysis. They will assist in the running of models and analysis of results.
- Involve the DWA personnel in the process of EWR extrapolation – run the models for a given site

- Involve personnel in site selections, data collection and analysis.
- Involve personnel in stakeholder engagement processes e.g. maintenance of the stakeholder databases, meeting arrangement and invitations, logistics, etc.
- Include personnel in scenario development – Project team workshops
- Provide DWA staff training on the use and application of the economic model.
- Include personnel in the IWRM summary template population.

The proposed capacity building programme and schedule is included as Appendix D.

Task 5 Deliverables –

i Quarterly capacity building progress reports

6.6 TASK 6: STUDY MANAGEMENT AND CO-ORDINATION

Mr Trevor Coleman will be responsible for overall project direction, management and coordination of the study. In order to ensure effective management of this study with the appropriate guidance from various levels of DWA the following management structures will be used for both guidance and review:

6.6.1 Client liaison

Liaison with the DWA Study Manager will include the following activities:

- Arrange Project Management Committee (PMC) over the course of the Study as required.
- Establishing interim communication (between meetings) to advise the Study Manager of, inter alia, important events or problem situations, possible changes to the scope of work, appointment of sub-consultants, etc.
- Compiling and updating the “Record of Decisions” and “Record of Administrative Requests” for the Study Manager and ensuring that all recorded actions are attended to within the specified budget and time limits of the Study.
- Motivating the appointment of proposed new members of the consultant team to the Study Manager, as and when required.
- Motivating the appointment of sub-consultants and/or co-consultants and specialists to the Study Manager.
- Implementing the appointment of the sub-consultants and/or co-consultants and specialists after approval by the Client.

6.6.2 Coordination of Study Team

The Project manager will be responsible for overall coordination of the Consultant Study Team and activities will include:

- Serving as link between DWA Study Manager and the study team.
- Ensuring that the sub-consultants and/or co-consultants and specialists are properly briefed by the Task Leaders prior to commencing with work.
- Convening regular meetings with the Task Leaders as dictated by programme and progress.
- Rendering guidance and assistance to the Task Leaders.

- Monitoring and control of performance, programming and cost of study, including revision of the Study Plan, if and when necessary.

6.6.3 Financial control

A financial control system, comprising an interactive spreadsheet model, will be used to monitor and control costs. The spreadsheet will be submitted to the client on continuous basis or on request. Budgets will be assigned to the key activities for each main Task. Actual costs incurred will be correlated with completion targets to ensure compliance with progress. Should deviations from the allocated costs for the key activities become evident, the Study Leader shall assess the reason/s and impact of such deviations and institute corrective action as required.

Where additional work may be required, the Study Leader shall obtain a detailed motivation and budget (both time and costs) from the relevant Task Leader for such additional activities for assessment and submission to the Study Manager for consideration and approval. No additional expenses outside the approved budget will be allowed without the prior written approval of the Client.

6.6.4 Study administration

Study administration duties to be performed will include:

- Compiling, certifying and submitting monthly invoices to the Client based on input received from the Task Leaders. The Client will be presented with only one invoice monthly from the Consultant Study Team. The Study Leader will arrange payment to the other members of the Study Team after receiving the same from the Client.
- Keeping minutes of meetings with the Client and other stakeholder bodies and distribution thereof to the interested parties, as required.
- Ensuring that all project files are kept up to date and accessible to the Client if and when required.
- The Study Leader will provide a secretariat to perform the required duties for the Study Management Committee.

6.6.5 Reporting and Reviewing System

The Project Management Committee will give overall guidance to the Study Team. Progress meetings will take place in accordance with the project plan. The findings of the study will be written up in the IWRM summary template in accordance with appropriate reporting guidelines and requirements.

Task 6 Deliverables –

- Progress reports documenting work progress against programme and actual expenditure against cash flow estimates.
- Minutes of the meetings
- Presentations as required
- Financial and administration information as required

6.7 SUMMARY OF DELIVERABLES

The summary of deliverables for the study as outlined per task will include the following:

Table 6: Summary of study deliverables

DELIVERABLE
Task 1: Study Inception
• Study Inception Report
• Capacity Building Programme and schedule
Task 2: Water Resource Information and Data gathering
• Information Analysis Report
• Inventory of water resource models and their capabilities
Task 3: Determination of the Management Class
• Integrated Units of Analysis report
• Socio-economic reports (Evaluation and the decision-analysis framework and Method Summary report, Analysis system)
• Ecological Water Requirements Report
• Base Scenario Configuration Report
• Final Scenario report (including assessment of consequences)
• IWRM template – Class configuration
Task 4: Communication and Liaison
• Stakeholder database
• Two Newsletters, Background Information Document, Media releases and Advertisements
• Notes and minutes/proceedings of PSC and stakeholder meetings held
• Registers of stakeholders of all meetings
• Issues and response report
Task 5: Capacity Building
• Quarterly capacity building reports
Task 6: Study Management
• Progress reports on study progress
• Minutes of meetings
• Presentations as required
• Financial and administration information as required

7 STUDY PROGRAMME

The study programme of the study tasks is provided as a bar chart programme of the tasks in Appendix E. In terms of the programme the study is expected to terminate in October 2012.

8 STUDY TEAM

8.1 GENERAL

The study team consists of Golder Associates Africa supported by Zitholele Consulting, Prime Africa Consultants (Pty) Ltd and supporting technical specialists.

The Study Leader for the study will be Trevor Coleman who has worked extensively on water resource projects over the years. He was involved in the development of the IWRM Plan for the Upper and Middle Olifants catchment and is extensively involved in the Management of the Controlled Released scheme for the Witbank and Middelburg Catchments. Trevor Coleman will be supported by Ralph Heath as study technical advisor and Priya Moodley as study co-ordinator. Task leaders include Trevor Coleman, Jackie Crafford, Anelle Lotter, Retha Stassen, Frans Wiegmans, Danie Otto and Hadley Kavin who are all experienced in working on large integrated projects and will provide an experienced support base to the study leadership.

The Study Leader will be responsible for the liaison with the Client and the general supervision of the Study.

8.2 TEAM MEMBERS

Details of the members that will be involved in the study are listed in Table 7 below.

Table 7: Team members involved in study

Name	Firm	Responsibility Level	Position in Team
T Coleman	Golder Associates	Project Manager	Project Manager
R Heath	Golder Associates	Project Director	Technical Advisor
F Wiegmans	Golder Associates	Divisional Leader: Senior Geohydrologist	Hydrogeology
D Otto	Golder Associates	Environmental Rehabilitation Scientist	Wetland
J Crafford	Prime Africa	General Manager	Socio-Economic
Dineo Mashimbye	Prime Africa	Statistician	Economics
Xolani Dlamini	Prime Africa	Project Manager	Environmental Management
Aimee Ginsburg	Prime Africa	Ecologist	Ecologist
Patiswa Mnqokoyi	Zitholele	Project Assistant and Logistics	Stakeholder Engagement
A Lotter	Zitholele	Divisional Leader: Environment and Communication	Stakeholder Engagement

Name	Firm	Responsibility Level	Position in Team
A Joubert	Zitholele	Stakeholder Engagement	Stakeholder Engagement
Priya Moodley	Golder Associates	Senior Scientist	Water Quality and IWRM
Didi Masoabi	Golder Associates	Scientist	Water Quality and IWRM
Oliver Malete	Golder Associates	Scientist	Water Quality and IWRM
Lae-Lee Scharnick	Golder Associates	Development Economics	Economics
Retha Stassen	Prime Africa	Hydrologist	Hydrology, water resources, Modelling and Environmental Flows
Maggie Mayer	Golder Associates	GIS	GIS Specialist
A Cochran	Golder Associates	Wetland specialist	Wetland
Anton Linstrom	Golder Associates	Divisional Leader	Ecologist
Johan Engelbrecht	Private Consultant		Ecologist and fish Specialist
A Joubert	Zitholele	Stakeholder Engagement	Stakeholder Engagement
H Kavin	Sole Proprietor	Water and Environmental Law Consultant	Legal Specialist
Pieter van Rooyen	WRP Consulting	Specialist WRPM	WRPM Support
Caryn Seago	WRP Consulting	Hydrologist	WRPM Support

The following changes to the team have been made since the proposal was developed and contract signed:

- The groundwater team composition has been reduced to include only Frans Wiegmans who will add the technical expertise required for the groundwater assessment and input.
- The role of Shareen Khamisa has been replaced by Priya Moodley.

The following additional team members are proposed for inclusion to the project team based on additional scoping work that has been done and the specialist input required. Approval of these team members by the client is still to be requested. Details of any changes to HDI participation will be provided in the submission.

- Anton Linstrom – as a wetland specialist (for wetland prioritization)
- Johan Engelbrecht – ecologist and fish specialist (for EWR determination)
- Pieter van Rooyen – WRPM specialist (support for modelling)
- Caryn Seago – WRP modelling (support)

8.3 ORGANISATIONAL STRUCTURE

The organisational structure related to task components is presented in Figure 7 on the next page.

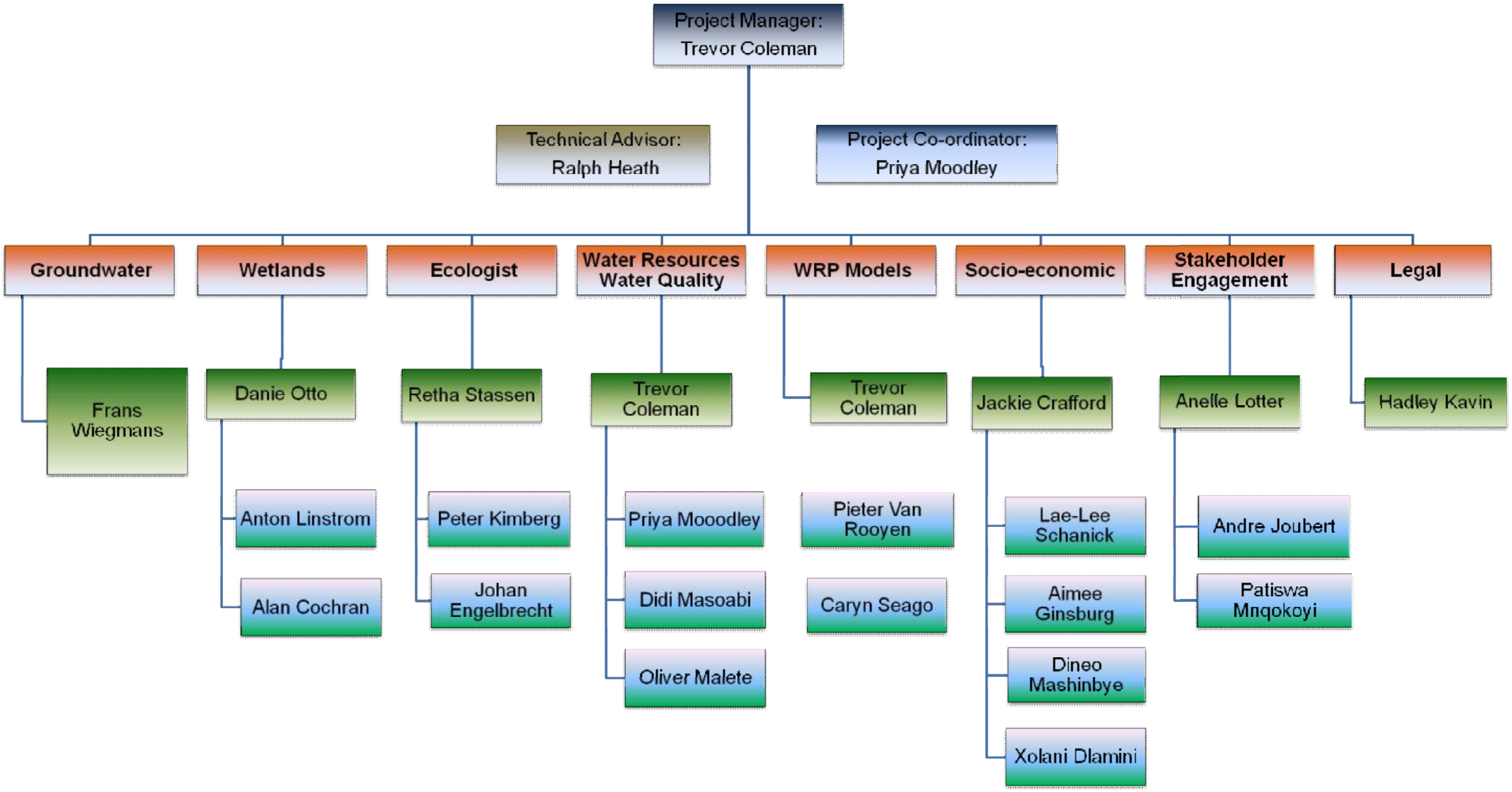

Figure 7: Organisational structure related to task breakdown

9 STUDY RISKS AND UNCERTAINTIES

The identified risks in the study are listed in Table 8.

Table 8: List of possible identified risks and uncertainties

Risk category	Risk description	Cause	Mitigation Action
Low	Lack of understanding of the WRC process and WRCS by stakeholders and the implications thereof. Risk of increased objections to the "unknown".	Classification of water resources is a new concept for stakeholders. The WRCS process is a new process being implemented for the first time. There is no previous experience or knowledge on what to expect.	Sufficient and accessible information about the WRC process, its objectives and aims should be communicated at every interaction with stakeholders (in writing, at meetings, through news releases, posters, power point presentations, etc). Do not be scared to repeat the same messages every time – do that until stakeholders have internalized the necessary information, definitions and processes. After the initial announcement of the process stakeholders can be requested to write down in 100 words their understanding of WRC and its objectives – review the written information to monitor their understanding.
	The constituted PSC may not be seen as sufficiently representative of the broader stakeholder community. This may also have time and budget implications for the study if there is a requirement to go back to stakeholders.	Lack of guidelines/criteria on the PSC composition. Who constitutes "key" stakeholder in terms of WRC process. Failure to adequately identify all key stakeholders at study inception could result in an objection being lodged by a stakeholder later on in the process as to their "exclusion".	A stakeholder consultation process is never closed - thus if suggestions for further members are made it should be considered. The PSC membership should be reviewed annually to ensure that members are representing all relevant sectors of society for the WRC process. The broader stakeholder community is represented through municipal structures – ensure that local and district municipal structures are represented.
Medium	Existing data available may be found to be inadequate to support all modelling processes	Overestimation of availability of data. Classification process requires more detailed data requirements that is not readily available (e.g. for water quality) or no longer applicable (e.g. some EWRs).	Best available information will be used and where possible modelling, extrapolation, estimations will be used. Every effort will be taken to ensure that the end results and outputs are technically sound, scientifically supported and defendable.

Risk category	Risk description	Cause	Mitigation Action
	Parallel studies may not deliver the required outputs as per the Olifants Study schedule. (e.g Recon study; PES/EIS study).	Classification study schedule not aligned to parallel study delivery dates. Delays in programmes of parallel studies and extent of information provided is less than expected.	Information available at the time will be used. As new information becomes available it will be included should it be within the study budget and timeframes (e.g. the PES/EIS information; water requirements information).
	Legal challenge on the network of significant water resources	Stakeholders do not accept significant water resources selected	Provision will be made for including additional sub-nodes in the models should it be practical and achievable.
High	The study programme is delayed. Study cannot conclude by October 2012.	Stakeholders need extended consultation on processes, methodology, models. Etc. Stakeholder objections/queries only received at Step 6 of the process during the scenario workshops. Delays in information from other parallel studies.	Technical Task group meeting are planned to take stakeholders through the modelling and the economic approach. Stakeholders will be also informed of progress and findings throughout the duration of the study. This will avoid receiving stakeholder concerns and queries only at the end of the process.
	Scenarios proposed are not accepted by stakeholders during the consultation stage (step 6 of the WRCS process). This could have time and budget implications for the study.	Stakeholders do not accept scenarios as presented. Process is not understood. Seen not to be part of it. Implications on water use are realized – not happy with outcome. Trade-offs cannot be agreed upon (highly used areas versus highly protected areas).	The process to develop scenarios will be explained to stakeholders from the inception. Stakeholders will be required to provide their inputs in the development of the scenarios. Once the process of developing scenarios is completed, stakeholders were part of it and would be less inclined to only comment negatively. The team will always, at each possible event explain the WRC process, it s aims and objectives to ensure that stakeholders internalize the process.

The risks listed above will be monitored through the project and the client will be informed should a risk pose a serious threat to the study progress.

10 REFERENCES

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APPENDIX A

TERMS AND DEFINITIONS

Terms and definitions

Some key terms and definitions as understood and interpreted by the study team for application in the study.

- *Integrated unit of analysis (IUAs)*: The basic unit of assessment for the classification of water resources. The IUAs incorporates socio-economic zones and is defined by catchment area boundaries. Twelve preliminary IUAs have been defined for the Olifants WMA.
- *Water Resource Planning Model (WRPM):* The WRPM setup for the WMA will be used to assess the scenarios. The outputs from the model will be shortfalls in supply to the various users which will be used for input to the economic analysis.
- *Resource Water Quality Objectives (RWQOs):* RWQOs are numeric or descriptive in-stream water quality objectives set to provide detail upon which to base the management of water quality. RWQOs integrate ecological water quality requirements that and user fitness for use requirements. The RWQOs as set in the upper and middle Olifants will be used as an input into the water quality component of the assessment.
- *Resource Quality Objectives (RQOs:* Numeric or descriptive (narrative) goals for resource quality (includes all aspects of water quantity, water quality and aquatic ecosystem quality, the latter including the quality of in-stream and riparian habitats and aquatic biota) within which a water resource must be managed. These are given legal status by being published in a Government Gazette.
- *Scenario:* consists of a set of classes set up for the IUAs and sub areas of the IUAs where applicable. There will be a base case scenario which is an initial scenario setup for the WMA by the project team. This scenario will be analysed and the results presented to the Project Steering Committee (PSC). Further scenarios will be developed based on the findings of the base scenario with inputs from the PSC. The additional scenarios will be analysed and the results taken back to the PSC and the broader stakeholders for discussion
- *Node:* These are modelling point's representative of an upstream reach or area of an aquatic eco-system (rivers, wetlands, estuaries and groundwater) for which a suite of relationships apply. A node is set at the outlet of an IUA where the flow and water quality requirements required to be met for a particular scenario are set. The flows set are based on the different categories set at the EWR sites.
- *Sub-nodes:* are nodes set within a particular IUA at which flows and water qualities will be set to protect a particular ecological subarea or user that is identified as important and sensitive. The sub-nodes will be setup in the model with specified flows that have to be met. This may change the behaviour of the system in terms of supply to the users and to meet the ecology.
- *Ecological Water Requirements:* The flow patterns (magnitude, timing and duration) and water quality needed to maintain a riverine ecosystem in a particular condition. This term is used to refer to both the quantity and quality components. The EWRs as determined by the Comprehensive Reserve study of 2001 will be applied in this study.
- *Ecological Water Requirement Sites:* Ecological Water Requirement sites are set at specific points on the river. These sites provide sufficient indicators for the specialists to assess environmental flows and information about the variety of conditions in a river reach. An EWR site consists of a length of river which may consist of various cross-sections for both hydraulic and ecological purposes. EWRs for 16 sites were recommended for preliminary Reserve as part of the Comprehensive Reserve study and 3 additional sites on smaller tributaries were recommended for lower confidence preliminary Reserves in 2007.
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- *Sub-quaternary catchments:* A finer subdivision of the quaternary catchments (the catchment areas of tributaries of main stem rivers in quaternary catchments). The update of the PES and EIS (2010) status is being determined per sub-quaternary.
- *Present Ecological State (PES):* The degree to which ecological conditions of an area have been modified from natural (reference) conditions. The measure is based on water quality variables, biotic indicators and habitat information. The PES at each existing EWR site will be assessed as part of this study.
- *Ecological Importance and Sensitivity (EIS):* Key indicators in the ecological classification of water resources. Ecological importance relates to the presence, representativeness and diversity of species of biota and habitat. Ecological sensitivity relates to the vulnerability of the habitat and biota to modifications that may occur in flows, water levels, physico-chemical conditions, etc. A current study to update the PES and the EIS of all sub quaternary catchments in the Olifants WMA is currently underway by the DWA and the Water Research Commission. Once the results of this update become available, it will be used as an additional consideration in assessing value and significance of water resources in the WMA.
- *Significant Water Resources:* Water resources that are deemed to be significant from a water resource use perspective, and/or for which sufficient data exist to enable an evaluation of changes in their ecological condition in response to changes in their quality and quantity of water. Water resources are deemed to be significant based on factors such as, but not limited to, aquatic importance, aquatic ecosystems to protect and socio-economic value.
- *Trade-offs*: Balancing of all factors in relation to the water resource and/or and IUA(s) that are not necessarily attainable at the same which may involve a giving up of one benefit, advantage, etc. in order to gain another regarded as more desirable. This may include balancing of those factors between use and protection (which may or may not be conflicting), between downstream impacts and upstream uses and vice versa, between possible use of resources within a catchment and between catchments, and between possible resource use between different parts of the country. Decisions on these trade-offs will have different implications for different stakeholders at local, regional and national levels.
- *Management Class (MC)*: The MC is representative of those attributes that the DWA (as the custodian) and society require of different water resources (consultative process). The process requires a wide range of trade-offs to assessed and evaluated at a number of scales. Final outcome of the process is a set of desired characteristics for use and ecological condition each of the water resources in a given catchment. The WRCS defines three management classes, Class I, II, and three based on extent of use and alteration of ecological condition from the predevelopment condition.

APPENDIX B

ISSUES AND RESPONSE REPORT (VERSION 1: AS AT 31 MARCH 2011)

THE CLASSIFICATION OF SIGNIFICANT WATER RESOURCES IN THE OLIFANTS WATER MANAGEMENT AREA

Issues and Responses Report

Version 1: as at 31 March 2011

This Issues and Responses Report (IRR) captures the issues raised by stakeholders during the classification study of significant water resources in the Olifants Water Management Area (WMA). The purpose of this report is to ensure that the concerns and comments raised by stakeholders are noted and adequately and satisfactorily addressed through the study process. This study has been commissioned by the Department of Water Affairs (DWA). The report will from part of the supporting documentation of the IWRM template that will be submitted to the delegated authority of DWA with the recommendations on the approval of proposed Management Classes (MCs).

As part of the announcement process, an advertisement was placed in various national newspapers and the first Project Steering Committee (PSC) meeting of the study was held on 18 February 2011 at Loskop Dam.

All written and oral submissions received from stakeholders will be summarised in this report and it will be updated on a regular basis during the course of the study. This Version 1 of the report captures comments and issues raised for the period ending 31 March 2011.

	COMMENTS, QUESTIONS AND ISSUES	COMMENTATOR(S)	SOURCE(S)	RESPONSE(S)
1	We have information that we can share with the study team. The mines in the Steelpoort area have a lot of water quality information that can be used by the study team. Most of this information is given through to the DWA, but he is not certain how it is being applied by the DWA. He will collect the information and pass it on the study team.	Mr Tendani Nditwani (DWA), Mr Mark Surmon (Rio Tinto) and Mr Bertus Bierman (Olifants River Joint Water Forum).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Trevor Coleman (Study Leader) thanked members for their offers of assistance and said the study team needs all the information it can get.
2	Areas adjacent to the Olifants WMA such as Mokopane and Polokwane which receive water from this WMA should also be included in the study. Members of the PSC should be made aware that water is currently being transferred to users outside the Olifants WMA. Water users falling outside the WMA have been included in the water demands used for the Reconciliation Strategy study, which will be used as a source of information for this study.	Mr Ockie van den Berg (DWA) and Mr Nditwani (DWA)	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Noted.
3	The mining area is not only confined to the Steelpoort area, but goes into neighbouring districts as well.	Mr Bertus Bierman (Olifants River Joint Water Forum).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Noted.
4	There is, for example a major difference between the Blyde River and the Blyde Dam, yet they are both in the same Integrated Unit of Analysis (IUA). He enquired whether these differences will be accounted for.	Mr Mark Surmon (Rio Tinto).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said this is the reason why sub-nodes are being used – to acknowledge major differences in the same IUA and to account for ecological important and sensitive areas.
5	Mr Surmon asked if the same will apply to sub-catchments in an IUA. Will it be possible to have a different Management Class (MC) for a sub-catchment in an IUA?	Mr Mark Surmon (Rio Tinto).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said it will be possible if there are major differences.

	COMMENTS, QUESTIONS AND ISSUES	COMMENTATOR(S)	SOURCE(S)	RESPONSE(S)
6	Mr Surmon asked if the international commitments of the Olifants WMA have been thought of.	Mr Mark Surmon (Rio Tinto).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said the commitment to Mozambique' has been taken care of at the start of this study.
7	Has future economic development been taken into consideration during this study?	Ms Stephinah Mudau (Chamber of Mines).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said that the scenario analysis and economic modelling will look at the impacts of future economic development. The models will be run considering different development scenarios.
8	Will the Management Classes (MCs) be reviewed after a specific period of time?	Ms Stephinah Mudau (Chamber of Mines).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said each MC will have a specific timeframe (probably around four or five years) when it has to be reviewed (in terms of the National Water Act).
9	Is there enough information available to do this study?	Ms Stephinah Mudau (Chamber of Mines).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said there is enough information and if something is not available, then the study team will not assess that aspect in detail.
10	Will there be an opportunity for PSC members to go through the finer details of the models to be used during this study.	Dr Koos Pretorius (Federation for a Sustainable Environment).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said this can be done, but the format (workshop/meeting) must first be decided upon. Dr Harrison Pienaar (DWA) said if there is a need for more meetings from the PSC members or stakeholders, then these meetings must take place.
11	How will the MCs be decided upon by the study team? He suggested the most sensitive IUAs be assigned the ecological classes first then cascaded to the areas of less ecological sensitivity.	Dr Thomas Gyedu-Ababio (SANPARKS).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said this forms an important part of this study. The status quo will most probably be used as the base scenario to undertake

	COMMENTS, QUESTIONS AND ISSUES	COMMENTATOR(S)	SOURCE(S)	RESPONSE(S)
				the first round of modelling and then the MC will be moved up or down, which will depend on various factors and scenarios that are agreed upon.
12	Dr Pretorius asked how the study team will decide what the status quo of a water resource will be. Do you start high of low?	Dr Koos Pretorius (Federation for a Sustainable Environment).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said this will be decided by the results of the study, but it is probably better to start low and then try and improve it when the review comes up.
13	Dr Pretorius asked if seasonal differences will also be taken into account.	Dr Koos Pretorius (Federation for a Sustainable Environment).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said seasonality will be part of the study.
14	It is good news to see that wetlands and pans will also be investigated as part of this study. This area is critical for the mining sector.	Mr Duane MacPherson (Anglo American).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Noted.
15	Wetlands and pans are becoming a major issue in the mining sector due to the mitigation measures that must be taken into account as per instructions from the Department of Environmental Affairs. It will assist the mining sector if the classification process can identify areas that may be mined as well as areas that cannot be accessed. The latter areas can then be classified as protected zones that may not be developed. This will be of great help to the coal mining sector in the Upper Olifants who can then concentrate on specific areas that may be developed for an energy resource.	Mr Duane MacPherson (Anglo American).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Noted.
16	How will the classification system be managed and enforced. How will an organisation, for example, be	Dr Hannes Botha (Mpumalanga Tourism	Meeting 1 of Project Steering Committee at	Mr Coleman explained that any proposed developed near a water

	COMMENTS, QUESTIONS AND ISSUES	COMMENTATOR(S)	SOURCE(S)	RESPONSE(S)
	able to object to a specific classification?	and Parks Agency).	Loskop Dam on 18 February 2011.	resource with a MC must do an environmental impact assessment as is the case with any proposed development.
17	Will the tributaries of the Olifants River such as the Letaba River be investigated? It is not part of this WMA, but it plays a significant role. The DWA is also investigating combining the Olifants WMA with the Levuvu-Letaba WMA in the near future.	Dr Thomas Gyedu-Ababio (SANPARKS).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Dr Pienaar said the DWA will investigate this request.
18	This is a very complex project and the workload should never be underestimated. Maybe a few workshops/meetings are needed before the next planned PSC meeting in November to handle problems that will crop up before then. We want this classification to become a reality and we are willing to help.	Dr Vik Cogho (Olifants River Forum).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Dr Pienaar said the Project Management Committee must take note of this suggestion.
19	He agrees with Dr Cogho. There are critical decisions that must be made at the beginning of the project that must first be thrashed out. It will be of no use if we have disagreements at the next PSC meeting in November, because then there will not be enough time to do address those problems. Rather have workshops/ meetings now to identify potential problems.	Dr Koos Pretorius (Federation for a Sustainable Environment).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Ms Naidoo said the classification process has a set of guidelines that must be followed. This will also assist the process and cut down on potential problems. A schedule of the planned meetings by the Technical Task Group will be made available to PSC members for their attendance.
20	What role will the Catchment Management Agency (CMA) play in the classification process?	Mr Duane MacPherson (Anglo American).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Dr Pienaar said a CMA will manage the MCs in its area. These areas will in the meantime be managed by the DWA until a CMA is in place.
21	He is not sure what is expected from his Department in this classification process. There is a lot of information available from his Department and he asked the study team to send through the specific requests for relevant	Mr Jan Potgieter (Department of Agriculture, Forestry and Fisheries).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Dr Pienaar said as the process unfolds the sectors will see what is expected of them and their role will become clearer when specific sectors

	COMMENTS, QUESTIONS AND ISSUES	COMMENTATOR(S)	SOURCE(S)	RESPONSE(S)
	data/information needed.			are engaged.
22	There are two distinctly different mining sectors in the Olifants WMA: coal mining in the Upper Olifants and the eastern sector of the Olifants with a variety of minerals such as platinum and chrome. Both areas need a separate meeting, because they differ vastly from each other.	Mr Bertus Bierman (Olifants River Joint Water Forum).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Noted.
23	Will the study team also be using maps and information other than provided by the DWA for this study?	Dr Koos Pretorius (Federation for a Sustainable Environment).	Meeting 1 of Project Steering Committee at Loskop Dam on 18 February 2011.	Mr Coleman said a vast variety of resources from many sources are being used and will be used in this study.
24	The scale of the Integrated Units of Analysis (IUA) for significant water resources is too wide as it includes tributaries, subquaternaries etc, for instance in the Blyde River the selection is not appropriate as some of the tributaries is in an A class category and of great ecological significance. With the IUA selection these important areas are in danger of being grouped together with less sensitive tributaries in a management class that does not recognise the different ecological sensitivity. There is a real danger that areas of irreplaceable aquatic importance can be compromised in decision making for authorising water licenses for developments etc. As an example the gorge in the Olifants River upstream of Loskop Dam currently fall IUA No 1 while the rest of the river in the Nature Reserve fall in IUA No 3. Therefore these two parts of the same sensitive ecosystem may very well have very different management class values and therefore very a different conservation value or status. The same is true for the Blyde River which fall two different IUA's.	Dr. M. Coetzee Senior Manager: Scientific Services Mpumalanga Tourism and Parks Agency (MTPA).	Letter via Email on 28 February 2011	The study will include a number of sub-nodes within IUAs to address the issue of the smaller more sensitive, important and "higher protected" tributaries. The process that has been developed is such that these smaller tributaries will be afforded higher protection levels even if the IUA is classified as a less protected class. The ecological importance and sensitivity of smaller tributaries will be accounted for taking into consideration their current PES. The reason that some ecosystems have been included in two separate IUAs is for the very reason – to try to delineate more sensitive, protected areas from impacted, 'hardworking' rivers so that their conservation value or status is protected.

	COMMENTS, QUESTIONS AND ISSUES	COMMENTATOR(S)	SOURCE(S)	RESPONSE(S)
25	With reference to IUA numbers 1-12 and their Present Ecological Status (PES) rating, we do not agree with the PES ratings given for the IUA's and the project team should please indicate who decided on these ratings, and what methodology was used in determining the PES. There is presently a process underway to determine the latest PES and EIS ratings for the Olifants River. This process is also being driven by the DWA and the question therefore becomes: Would it not be more acceptable to rather use the latest information and ratings that was determined through sound scientific methods?	Dr. M. Coetzee Senior Manager: Scientific Services Mpumalanga Tourism and Parks Agency	Email on 28 February 2011	The PES used in the questionnaire is based on the latest information that was available per quaternary catchment based on the report from Water for Africa that was completed in 2006. This report is an update on the 1999 desktop study and the results of the 2001 Olifants River Comprehensive Reserve study undertaken. The approach included will be using updated the PES/EIS (2010) as currently be determined through a parallel DWA study. Results are expected by June 2011.
26	It would make more scientific sense to survey and determine the PES of all streams in all IUA's individually and then to determine a central tendency statistically in order to calculate the integrated PES for all IUA's individually. The concern here is that the current method which seem to rely on the opinions and sentiments of stakeholders (many of whom are not aquatic scientists) to determine a PES value / management class for the IUA's are scientifically unsound and will not give any indication of the true status of the resource.	Dr M. Coetzee Senior Manager: Scientific Services Mpumalanga Tourism and Parks Agency	Email on 28 February 2011	The PES listed per IUA was an indication where the system is for the entire IUA (average status) and does not exclude the fact that there are specific reaches that are still in a good state. During the classification study process these reaches will be acknowledged, as they will form part of the scenarios that we will be considered to determine the final MC. The PES of all streams will be considered individually based on the latest information received from the 2010 PES/EIS update study.
27	The danger in widening the management classes (and therefore in effect then lowering their values) is without doubt that additional extensive pressure will be put on an already stressed river.	Dr M. Coetzee Senior Manager: Scientific Services Mpumalanga Tourism	Email on 28 February 2011	Management classes will be set so that they are technically sound, scientifically credible, practical and achievable. They will apply to an IUA where applicable and where so

	COMMENTS, QUESTIONS AND ISSUES	COMMENTATOR(S)	SOURCE(S)	RESPONSE(S)
		and Parks Agency		defined to the smaller tributary catchments as determined. Sub-nodes (to which different MCs may apply) will be used to address areas that are ecologically different.
28	It seems very likely that the proposed new management classes and the approach to substitute PES for management classes will be to the advantage of water users who make use of the resource for purposes other than conservation / environmental flow requirements / ecological water requirements.	Dr M. Coetzee Senior Manager: Scientific Services Mpumalanga Tourism and Parks Agency	Email on 28 February 2011	The management classes will not be a substitute for the PES of water resources. The PES will be used as a key inputs into the scenarios that we will be considered to determine the final MC. The scenarios will be formulated such that no one water user will be favoured. The scenarios will be reviewed by the PSC before any MCs are proposed.
29	In view of these concerns under points 24 to 28, the MTPA proposes that the concerns be addressed through an expert workshop where aquatic specialists could provide inputs in this very important process, or that a Task Team consisting of expert aquatic specialists be set up to guide the project team in the classification of significant water resources in the Olifants Water Management Area. Completion of the questionnaire will be pending such as workshop or specialist task team meeting.	Dr M. Coetzee Senior Manager: Scientific Services Mpumalanga Tourism and Parks Agency	Email on 28 February 2011	The concerns raised will be also be clarified through the first technical task group meeting that will be held as part of the study process. It does not require a specific workshop.

APPENDIX C

PROPOSED PROJECT STEERING COMMITTEE MEMBERSHIP FOR THE CLASSIFICATION OF SIGNIFICANT WATER RESOURCES IN THE OLIFANTS WMA STUDY

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Name	Affiliation	Designation	Email address	Contact details
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APPENDIX D

CAPACITY BUILDING PROGRAMME AND SCHEDULE

CLASSIFICATION OF SIGNIFICANT WATER RESOURCES IN THE OLIFANTS WMA

CAPACITY BUILDING PROGRAMME

	CAPACITY BUILDING ACTIVITY PER STUDY TASKS	LEVEL OF TRAINING	TIMEFRAME	KEY PERFORMANCE AREA	KNOWLEDGE AREA GAP	LEARNING AREA ADDRESSED
TASK 1: INCEPTION						
1.1	**Introduction to IWRM**	Discussion and demonstration	6 hours	**IWRM**	**Understanding of classification within the larger IWRM process**	IWRM Policy and legislation: Overview of IWRM
1.2	**Water economics course**	Discussion and demonstration and application	16 hours	**Water Resource information and data sourcing/Implementation of the WRCS process**	**Data interpretation (socio economics); Evaluating ecosystem services; Determing scenarios**	Understanding biophysical processes; Resource economics; Socio-economic issues
1.3	**Project Management**	Discussion and demonstration	8 hours	**Project Management**	**Project Management - Financial and administrative tools**	Project Administration and financial management
TASK 2: WATER RESOURCES INFORMATION AND DATA GATHERING						
2.1	**Assessment of data, models, information**	Discussion and demonstration	6 hours	**Water Resource information and data sourcing**	**Data interpretation**	Understanding biophysical processes: - water quantity and quality - hydrology - ecology - economics Understanding basin systems and modelling
		Application	16 hours			
TASK 3: DETERMINATION OF THE MANAGEMENT CLASS						
3.1	**WRPM training**	Discussion and demonstration	16 hours	**Water resource Modelling**	**Hydrological assessment and modelling**	Water Resource assessments (WRYM and WRPM)
		Application	44 hours			
3.2	**IUA Delineation**	Discussion and demonstration	6 hours	**Implementation of the WRCS process**	**Delineating IUAs**	Use of GIS and mapping of IUAs
3.3	**EWR extrapolation** (running of models)	Discussion and demonstration	4 hours	**Implementation of the WRCS process**	**Extrapolation of data from EWR sites to nodes**	Understanding of EWR sites and nodes and related biophysical processes
		Application	6 hours			
3.4	**Rapid Reserve assessments**	Discussion and demonstration	6 hours	**Implementation of the WRCS process**	**Desktop Reserve Determination**	Running of Desktop RDM model
3.5	**Scenario development**	Discussion and demonstration	8 hours	**Implementation of the WRCS process**	**Understanding the relationship between social, economic and ecological trade-offs**	Scenario generation and understanding of trade-offs within larger IWRM process
3.6	**Scenario analysis**	Application	24 hours	**Implementation of the WRCS process**	**Understanding the relationship between social, economic and ecological trade-offs**	Running of yield models and determination of implications of alternate scenarios
3.7	**Economic Modelling**	Application	24 hours	**Implementation of the WRCS process**	**Understanding the relationship between social, economic and ecological trade-offs**	Socio-economic issues - running of economic models and determination of implications of scenarios
TASK 4: COMMUNICATION AND LIAISON						
4.1	**Stakeholder Consultation**	Discussion and demonstration	6 hours	**Stakeholder consultation**	**Public Partcipation processes**	Communication, public participation and stakeholder engagement processes
TASK 6: REPORTING						
6.1	**Population of IWRM summary template**	Discussion and demonstration	4 hours	**Implementation of the WRCS process**	**Towards the gazetting process**	Population of the IWRM template with class recommendations

Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12
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▲ = Detail

♦ = Introduction

APPENDIX E

STUDY PROGRAMME

STUDY PROGAMME: CLASSIFICATION OF SIGNIFICANT WATER RESOURCES IN THE OLIFANTS WMA

	STUDY TASKS	YEAR																							
		2010			2011												2012								
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Task 1	**Project Inception**																								
	Documentation of all relevant information on studies conducted																								
	Identification of potential IUA																								
	Development of a capacity building programme																								
	Draft Inception Report																								
	Meeting with Client																								
	Final Inception Report																								
Task 2	**Water resources information and data gathering**																								
	Literature review																								
	Information gap analysis																								
	Identification of additional work to be done and recommendations																								
	Inventory of currently available water reources models																								
	Report																								
Task 3	**Determination of the Management Class**																								
Step 1	Delineation of units of analysis and describe status quo of the water resources																								
Step 2	Link the value and condition of the water resource																								
Step 3	Quantify the Ecological Water Requirements (EWRs) and changes in non-water quality Ecosystem Goods, Services and Attributes (EGSAs)																								
Step 4	Determine an Ecological Sustainable Base Configuration (ESBC) scenario and establish starter configuration scenarios																								
Step 5	Evaluate the scenarios within the Integrated Water Resource Management (IWRM) process																								
Step 6	Evaluate the scenarios with stakeholders																								
Step 7	Gazette the class configuration																								
Task 4	**Communication and liaison**																								
	Stakeholder identification and database development																								
	Compile an anouncement document, reply sheet and introduction letter																								
	PSC meetings																								
	Stakeholder workshops/meeting arrangements																								
	Continous communication - information for website																								
	Newsletter development																								
	Feedback letters																								
Task 5	**Capacity Building (Skills development and transfer)**																								
Task 6	**Reporting**																								
	Progress reports																								
	Project Finalization Phase																								
	Finalization of all deliverables																								
	Compilation of IWRM summary																								
	Presentation of recommended class to DWA																								
	Final IWRM template																								
	Study Management																								
	Project management team meetings																								